```
/*
<span id="gsh" data-title="GShell" data-author="sato@its-more.jp">
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<link rel="icon" id="GshFaviconURL" href=""><!-- place holder -->
<span id="GshVersion" hidden="">gsh--0.7.3--2020-10-22--SatoxITS</span>
<title id="GshTitle">GShell-0.7.3 by SatoxITS</title>

<div id="GshHeading">
<div id="GshTopbar" class="MetaWindow"></div>
<div id="GshPerfMon"></div>
<div id="GshSidebar" class="SbSidebar" style=""><div id="GshIndexer" style=""></div></div>
</div>
<div id="GshMain">
<div id="GshBanner" height="100px" onclick="shiftBG();">
<div align="right"><note><a href="http://archive.gshell.org">GShell</a> version 0.7.3 // 2020-10-22 // SatoxITS</note></div>
</div>
*/

//<!-- ---------- Work { ---------- -->
//<span id="Topbar_WorkCodeSpan">
/*
<details><summary>Topbar</summary>
<!-- ---------- Topbar // 2020-1008 SatoxITS { -->
<h2>Topbar</h2>
<input id="Topbar_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="Topbar_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="Topbar_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<span id="Topbar_WorkCodeView"></span>
</details>

<style>
#GshHeading {
    display:inline;
    overlow:visible;
}
.ConfigIcon {
    position:absolute;
    top:-6px;
    left:92%;
    width:32px;
    height:32px;
}
.MetaWindow {
    z-index:1000;
    position:relative;
    display:block;
    overflow:visible !important;
    width:99.9%;
    height:22px;
    top:-22px;
    border:1px solid #22a;
    margin:0px;
    left:0.0%;
    line-height:1.0;
    font-family:Georgia;
    color:#fff;
    font-size:12pt;
    text-align:center;
    vertical-align:middle;
    padding:4px;
    xxbackground-color:rgba(0,8,170,0.8);
    background-color:#3a4861;xxx-PBlue;
    vertical-align:middle;
}
.MetaWindow:hover {
    color:#000;
    border:1px solid #22a;
    background-color:rgba(255,255,255,1.0);
}
#GshBanner {
    overflow:visible;
    display:block;
    width:100%;
    height:100px;
    left:inherit !important;
}
</style>
<script>
function Topbar_openWorkCodeView(){
    function Topbar_showWorkCode(){
        showHtmlCode(Topbar_WorkCodeView,Topbar_WorkCodeSpan);
    }
    Topbar_WorkCodeViewOpen.addEventListener('click',Topbar_showWorkCode);
}
Topbar_openWorkCodeView();
function ConfigClick(){
    if( 0 <= AffView.style.zIndex ){
        AffView.style.saved_zIndex = AffView.style.zIndex;
        AffView.style.zIndex = -1000;
        GshSidebar.style.zIndex = -1;
        GshPerfMon.style.zIndex = -1;
    }else{
        //AffView.style.zIndex = AffView.style.saved_zIndex;
        AffView.style.zIndex = 1;
        GshSidebar.style.zIndex = 1;
        GshPerfMon.style.zIndex = 1;
        GMenu.style.zIndex = 10000000;
    }
    console.log('AffZidex='+AffView.style.zIndex);
}
function Gshell_initTopbar(){
    GshTopbar.innerHTML = GshTitle.innerHTML;
    //<img id="ConfigIcon" class="ConfigIcon">
    if( true ){
        cfgi = document.createElement('img');
        cfgi.id = 'ConfigIcon';
        cfgi.setAttribute('class','ConfigIcon');
        GshTopbar.appendChild(cfgi);
        cfgi.src = ConfigICON_DATA;

        //cfgi.style.zIndex = 10000000000;
        //cfgi.addEventListener('click',ConfigClick);
        GshTopbar.addEventListener('click',ConfigClick);
    }
}
</script>
<!-- Topbar_WorkCodeSpan } -->
*/ //</span>
//<!-- ---------- Work } ---------- -->


//<!-- ---------- Work { ---------- -->
//<span id="Indexer_WorkCodeSpan">
/*
<details><summary>Indexer</summary>
<!-- ---------- Indexer // 2020-1007 SatoxITS { -->
<h2>Indexer</h2>
<input id="Indexer_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="Indexer_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="Indexer_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<span id="Indexer_WorkCodeView"></span>
</details>
<style id="SidebarIndex">
#gsh {
    display:block;
    xxxoverflow:scroll !important;
}
#GshMain {
    z-index:1;
    position:relative;
    display:block;
    width:80% !important;
    left:19.5% !important;
}
#GshSidebar {
    z-index:0;
    position:relative !important;
    overflow:auto;
    resize:both !important;
    xxoverflow-y:hidden !important;
    xxxheight:100px !important;
    xxxdisplay:inline !important;
    left:0px;
    top:0px;
    width:19.5%;
    min-width:80px;
    xxxheight:100% !important;
    height:0px;
    color:#f00;
    xxbackground-color:rgba(64,64,64,0.5);
```

```
    xxbackground-color:#DFE3EB;xxx-PBlue;
    background-color:#eeeeee;xxx-PBlue;
}
#GshPerfMon {
    position:relative;
    display:block;
    overflow:visible;
    z-index:0 !important;
    xxheight:12pt;
    font-family:monospace, Courier New !important;
    font-size:9pt !important;
    color:#f84;
    top:-20px;
}
#GshPerfMon:hover {
    z-index:3 !important;
}
#GshSidebar:hover {
    z-index:2;
    overflow-x:visible !important;
    background-color:rgba(255,255,255,0.7);
    width:50%;
}
#GshIndexer {
    z-index:0;
    position:relative;
    resize:both !important;
    height:100%;
    left:0px;
    top:0px;
    scroll-behavior: overflow !important;
    padding-left:4pt;
    font-size:0.5em;
    white-space:nowrap;
    xxx-background-color:rgba(64,160,64,0.6) !important;
    color:#7794c6;xxx-PBlue;
    xxbackground-color:#DFE3EB;xxx-PBlue;
    background-color:#eeeeee;xxx-PBlue;
}
#GshIndexer:hover {
    z-index:10000000;
    overflow-x:visible !important;
    color:#000000 !important;xxx-PBlue;
    xxxbackground-color:#FFFFFF;xxx-PBlue;
    background-color:rgba(255,255,255,0.7);
    padding-right:0px;
    width:80%;
}
#GshIndexer:select {
    color:#000000 !important;xxx-PBlue;
    background-color:#FFFFFF;xxx-PBlue;
}
.IndexLine {
    font-size:8pt !important;
    font-family:Georgia;
    display:block;
    xxx-color:#fff;
    xxx-color:#eff1f5;xxx-PBlue;
    xxx-color:#41516d;xxx-PBlue;
    xxx-color:#7794c6;xxx-PBlue;
    padding-right:4pt;
}
.IndexLine:hover {
    font-size:10pt!important;
    xxx-color:#228;
    xxx-background-color:#fff;
    xxxcolor:#fff;xxx-PBlue;
    color:#516487;xxx-PBlue;
    background-color:rgba(220,220,255,1.0);xxx-PBlue;
    xxxtext-shadow:1px 1px #3f3;
    text-shadow:1px 1px #eee;
    xxxbackground-color:#516487;xxx-PBlue;
    xxtext-decoration:underline !important;
}
</style>

<script id="Indexer_WorkScript">
function Indexer_openWorkCodeView(){
    function Indexer_showWorkCode(){
        showHtmlCode(Indexer_WorkCodeView,Indexer_WorkCodeSpan);
    }
    Indexer_WorkCodeViewOpen.addEventListener('click',Indexer_showWorkCode);
}
//Indexer_WorkCodeViewOpen.addEventListener('click',Indexer_openWorkCodeView);
Indexer_openWorkCodeView();

var startPerfDate = new Date();
var prevPerfDate = startPerfDate;
function ShowResourceUsage(){
    d = new Date();
    perf = '';
    perf += '<'+'font color="gray">UA:' + window.navigator.userAgent +'<'+'/font><br>\n';
    perf += DateShort0(startPerfDate) + '<br>\n';
    perf += DateShort() + '<br>\n';
    elps = d.getTime() - startPerfDate.getTime();
    itvl = d.getTime() - prevPerfDate.getTime();
    perf += 'Elapsed: ' + elps/1000 + ' s<br>\n';
    perf += 'Skew: ' + (itvl-1000) + ' ms<br>\n';
    prevPerfDate = d;

    if( performance.memory !== undefined ){
        m0 = performance.memory;
        mu0 = (m0.usedJSHeapSize / 1000000.0); //.toFixed(6);
        perf += 'Memory: '+mu0+' MB<br>\n';
    }
    perf += '<br>\n';

    //GshSidebar.innerHTML = perf;
    GshPerfMon.innerHTML = perf;
    //GshIndexer.innerHTML = 'Memory: '+mu0+' MB';
    //console.log('-- PerfMon heap: '+mu0+'/'+m0.totalHeapSize+'/'+m0.jsHeapSizeLimit);
    if( true ){
        GshSidebar.style.zIndex = 1000;
        GshIndexer.style.zIndex = 0;
        GshPerfMon.style.zIndex = 1;
        //GshSidebar.appendChild(GshPerfMon);
        if( document.getElementById('primary') == null ){ // not in WordPress
//          GshPerfMon.style.position = 'absolute';
        }
        GshPerfMon.style.display = 'block';
        GshPerfMon.style.marginLeft = '4px';
        //GshPerfMon.style.top = '45px';
GshPerfMon.style.position = 'relative';
//GshPerfMon.style.position = 'absolute';
//topy = GshTopbar.getBoundingClientRect().top;
//topy = parseInt(topy) + 40;
        //GshPerfMon.style.top = topy + 'px';
        GshPerfMon.style.left = '0px';

        GshMain.style.top = -GshPerfMon.getBoundingClientRect().height;
    }
}
function ResetPerfMon(){
    GshPerfMon.removeAttribute('style');
    GshSidebar.removeAttribute('style');
}

var iserno = 0;
var GeneratedId = 0;
function generateIndex(ni,e,chv,nch,ht){
    // https://developer.mozilla.org/en-US/docs/Web/API/Element
    c = '';
    if( e.classList != null ){
        c = e.classList.value;
    }
    //console.log('-- <'+e.nodeName+'> #'+e.id+' .'+c+' '+e.attributes);
    if( e.nodeName == '#text' ){ return ''; }
    if( e.nodeName == '#comment' ){ return ''; }
    if( e.nodeName == 'H2' || e.nodeName == 'H3' ){
        id = e.innerHTML;
        GeneratedId += 1;
        eid = 'GenratedId-'+GeneratedId;
        e.id = eid;
    }else
    if( e.nodeName == 'SUMMARY' ){
        id = e.innerHTML;
        GeneratedId += 1;
        eid = 'GenratedId-'+GeneratedId;
        e.id = eid;
    }else
    if( and(e.nodeName == 'DIV',c=='xxxxxxxxxxxxxxxxxxentry-content') ){
        console.log('-- DIV entry-content begin');
```

```
        id = e.innerHTML;
        GeneratedId += 1;
        eid = 'GenratedId-'+GeneratedId;
        e.id = eid;
        console.log('-- DIV entry-content end hash-child=',e.hasChildNodes());
    }else
    if( e.id == '' || e.id == 'undefined' ){
        return '';
    }else{
        id = '#'+e.id;
        eid = e.id;
    }
    iserno += 1;
    ht = '<'+'div id="GenaratedEref_'+iserno+'" class="IndexLine" href="'+eid+'">'
        + iserno+' '+ni+':'+e.nodeName + ':' + id;
    if( e.id == '' || e.id == 'undefined' ){ return ht + '<'+'/div>'; }
    if( !e.hasChildNodes() ){ return ht + '<'+'/div>'; }
    chv = e.childNodes;
    nch = e.childNodes.length;
    if( chv != null ){ nch = chv.length; }
    ht += ' ('+nch+')' + '<'+'/div>';
    for( let i = 0; i < chv.length; i++ ){
        sec = ni+'.'+i;
        if( ni == '' ){ sec = i; }
        ht += generateIndex(sec,chv[i],null,0);
    }
    return ht;
}
function onClickIndex(e){
    tid = e.target.id;
    tge = document.getElementById(tid);
    eid = tge.getAttribute('href');
    rx = tge.getBoundingClientRect().left.toFixed(0)
    ry = tge.getBoundingClientRect().top.toFixed(0)
    if( false ){
        alert('index clicked mouse(x='+e.x+', y='+e.y+')'
            + '\ntid=#'+ tid + ' rx='+rx + ',ry='+ry
            + '\neid=' + eid + '\n'
            + '\nhtml='+ tge.outerHTML);
    }
    ee = document.getElementById(eid);
    sx = 'NaN';
    sy = ee.getBoundingClientRect().top;
    console.log('sx='+sx+',sy='+sy);
    ee.scrollIntoView()
    window.scrollTo(sx,sy)
    //window.scrollTo({left:'Non',top:sy,behavior:'smooth'});
}
function Indexer_afterLoaded(){
    sideindex = document.getElementById('GshIndexer');
    ht = '<'+'h3>G-Index<'+'/h3>';
    ht += generateIndex("",document.getElementById('gsh'),null,0,'');
    if( (pri = document.getElementById('primary')) != null ){
        ht += generateIndex("",pri,null,0,'');
    }
    ht += '<'+'br>';
    ht += '<'+'br>';
    ht += '<'+'br>';
    ht += '<'+'br>';
    sideindex.innerHTML = ht;
    sideindex.addEventListener('click',onClickIndex);

    if( (pri = document.getElementById('primary')) != null ){
        console.log('-- Seems in WordPress');
        pri.style.zIndex = 2000;

        GshSidebar.style.setProperty('position','relative','important');
        GshSidebar.style.top = '-1400px';
        //GshSidebar.style.setProperty('position','absolute','important');
        //GshSidebar.style.top = '0px';

        GshSidebar.style.setProperty('width','200px','important');
        GshSidebar.style.setProperty('overflow','scroll','important');
        GshSidebar.style.resize = 'both';

        GshSidebar.style.left = '-100px';
        GshIndexer.style.left = '100px';
        GshIndexer.style.height = '1400px';
        gsh.appendChild(GshSidebar); // change parent
    }else{
        console.log('-- Seems not in WordPress');
        GshSidebar.style.setProperty('position','fixed','important');
    }
}
//document.addEventListener('load',Indexer_afterLoaded);

DestroyIndexBar = function(){
    sideindex = document.getElementById('GshIndexer');
    sideindex.innerHTML = "";
    sideindex.style = "";
}
</script>

<!-- Indexer_WorkCodeSpan } -->
*/ //</span>
//<!-- ---------- Work } ---------- -->


/*
<h2>GShell // a General purpose Shell built on the top of Golang</h2>
<p>
<note>
It is a shell for myself, by myself, of myself. --SatoxITS(^-^)
<a href="gsh-0.6.2.go.html">prev.</a>
</note>
</p>
<div id="GJFactory_x"></div>

<div>
<span id="GshMenu" class="GshMenu">
<span class="GshMenu1" id="GshMenuEdit" onclick="html_edit();">Edit</span>
<span class="GshMenu1" id="GshMenuSave" onclick="html_save();">Save</span>
<span class="GshMenu1" id="GshMenuLoad" onclick="html_load();">Load</span>
<span class="GshMenu1" id="GshMenuVers" onclick="html_ver0();">Vers</span>
<span id="gsh-WinId" onclick="win_jump('0.1')">0</span>
<span class="GshMenu1" id="gsh-menu-exit" onclick="html_close();"></span>
<span class="GshMenu1" id="gsh-menu-fork" onclick="html_fork();">Fork</span>
<span class="GshMenu1" id="GshMenuStop" onclick="html_stop(this,true);">Stop</span>
<span class="GshMenu1" id="GshMenuFold" onclick="html_fold(this);">Unfold</span>
<span class="GshMenu1" id="gsh-menu-cksum" onclick="html_digest();">Digest</span>
<span class="GshMenu1" id="GshMenuSign" onclick="html_sign(this);" style="">Source</span>
<!-- | <span id="gsh-menu-pure" onclick="html_pure(this);">Pure</span> -->
</span>
</div>
*/

/*
<details id="GshStatement" class="gsh-document"><summary>Statement</summary>
<h3>Fun to create a shell</h3>
<p>For a programmer, it must be far easy and fun to create his own simple shell
rightly fitting to his favor and necessities, than learning existing shells with
complex full features that he never use.
I, as one of programmers, am writing this tiny shell for my own real needs,
totally from scratch, with fun.
</p><p>
For a programmer, it is fun to learn new computer languages.  For long years before
writing this software, I had been specialized to C and early HTML2 :-).
Now writing this software,  I'm learning Go language, HTML5, JavaScript and CSS
on demand as a novice of these, with fun.
</p><p>
This single file "gsh.go", that is executable by Go, contains all of the code written
in Go. Also it can be displayed as "gsh.go.html" by browsers. It is a standalone
HTML file that works as the viewer of the code of itself, and as the "home page" of
this software.
</p><p>
Because this HTML file is a Go program, you may run it as a real shell program
on your computer.
But you must be aware that this program is written under situation like above.
Needless to say, there is no warranty for this program in any means.
</p>
<address>Aug 2020, SatoxITS (sato@its-more.jp)</address>
</details>
*/
/*
<details id="GshFeatures" class="gsh-document"><summary>Features</summary><p>
</p>
<h3>Cross-browser communication</h3>
<p>
... to be written ...
</p>
<h3>Vi compatible command line editor</h3>
<p>
```

```
The command line of GShell can be edited with commands compatible with
<a href="https://www.washington.edu/computing/unix/vi.html"><b>vi</b></a>.
As in vi, you can enter <i><b>command mode</b></i> by <b>ESC</b> key,
then move around in the history by <b><code>j k / ? n N</code></b>,
or within the current line by <b><code>l h f w b 0 $ %</code></b> or so.
</p>
</details>
*/
/*
<details id="gsh-gindex">
<summary>Index</summary><div class="gsh-src">
Documents
    <span class="gsh-link" onclick="jumpto_JavaScriptView();">Command summary</span>
Go lang part<span class="gsh-src" onclick="document.getElementById('gsh-gocode').open=true;">
    Package structures
        <a href="#import">import</a>
        <a href="#struct">struct</a>
    Main functions
        <a href="#comexpansion">str-expansion</a>   // macro processor
        <a href="#finder">finder</a>        // builtin find + du
        <a href="#grep">grep</a>          // builtin grep + wc + cksum + ...
        <a href="#plugin">plugin</a>        // plugin commands
        <a href="#ex-commands">system</a>      // external commands
        <a href="#builtin">builtin</a>      // builtin commands
        <a href="#network">network</a>      // socket handler
        <a href="#remote-sh">remote-sh</a>  // remote shell
        <a href="#redirect">redirect</a>    // StdIn/Out redireciton
        <a href="#history">history</a>      // command history
        <a href="#rusage">rusage</a>        // resouce usage
        <a href="#encode">encode</a>        // encode / decode
        <a href="#IME">IME</a>      // command line IME
        <a href="#getline">getline</a>      // line editor
        <a href="#scanf">scanf</a>      // string decomposer
        <a href="#interpreter">interpreter</a>  // command interpreter
        <a href="#main">main</a>
</span>
JavaScript part
    <a href="#script-src-view" class="gsh-link" onclick="jumpto_JavaScriptView();">Source</a>
    <a href="#gsh-data-frame" class="gsh-link" onclick="jumpto_DataView();">Builtin data</a>
CSS part
    <a href="#style-src-view" class="gsh-link" onclick="jumpto_StyleView();">Source</a>
References
    <a href="#" class="gsh-link" onclick="jumpto_WholeView();">Internal</a>
    <a href="#gsh-reference" class="gsh-link" onclick="jumpto_ReferenceView();">External</a>
Whole parts
    <a href="#whole-src-view" class="gsh-link" onclick="jumpto_WholeView();">Source</a>
    <a href="#whole-src-view" class="gsh-link" onclick="jumpto_WholeView();">Download</a>
    <a href="#whole-src-view" class="gsh-link" onclick="jumpto_WholeView();">Dump</a>

</div>
</details>
*/
//<details id="gsh-gocode">
//<summary>Go Source</summary><div class="gsh-src" onclick="document.getElementById('gsh-gocode').open=false;">
// gsh - Go lang based Shell
// (c) 2020 ITS more Co., Ltd.
// 2020-0807 created by SatoxITS (sato@its-more.jp)

package main // gsh main

// <a name="import">Imported packages</a> // <a href="https://golang.org/pkg/">Packages</a>
import (
    "fmt"        // <a href="https://golang.org/pkg/fmt/">fmt</a>
    "errors"
    "strings"    // <a href="https://golang.org/pkg/strings/">strings</a>
    "strconv"    // <a href="https://golang.org/pkg/strconv/">strconv</a>
    "sort"       // <a href="https://golang.org/pkg/sort/">sort</a>
    "time"       // <a href="https://golang.org/pkg/time/">time</a>
    "bufio"      // <a href="https://golang.org/pkg/bufio/">bufio</a>
    "io/ioutil" // <a href="https://golang.org/pkg/io/ioutil/">ioutil</a>
    "os"         // <a href="https://golang.org/pkg/os/">os</a>
    "syscall"    // <a href="https://golang.org/pkg/syscall/">syscall</a>
    "plugin"     // <a href="https://golang.org/pkg/plugin/">plugin</a>
    "net"        // <a href="https://golang.org/pkg/net/">net</a>
    "net/http"   // <a href="https://golang.org/pkg/net/http/">http</a>
    //"html"     // <a href="https://golang.org/pkg/html/">html</a>
    "path/filepath" // <a href="https://golang.org/pkg/path/filepath/">filepath</a>
    "go/types"   // <a href="https://golang.org/pkg/go/types/">types</a>
    "go/token"   // <a href="https://golang.org/pkg/go/token/">token</a>
    "encoding/base64"    // <a href="https://golang.org/pkg/encoding/base64/">base64</a>
    "unicode/utf8"   // <a href="https://golang.org/pkg/unicode/utf8/">utf8</a>
    //"gshdata" // gshell's logo and source code
    "hash/crc32"     // <a href="https://golang.org/pkg/unicode/hash/crc32/">crc32</a>
    "golang.org/x/net/websocket"
    "runtime"
)


/*
#include <stdio.h> // </stdio.h> to be closed as HTML tag :-p
#ifdef _WIN32
#include <windows.h> // </windows.h>
// 2020-1022 added -- terminal mode on Windows
// https://docs.microsoft.com/en-us/windows/console/setconsolemode
// https://docs.microsoft.com/en-us/windows/win32/inputdev/using-keyboard-input
int setTermRaw(){
    HANDLE hStdin = GetStdHandle(STD_INPUT_HANDLE);
    DWORD tmode = 0;
    if( GetConsoleMode(hStdin,&tmode) ){
        DWORD xmode = tmode;
        xmode &= ~ENABLE_ECHO_INPUT;
        xmode &= ~ENABLE_LINE_INPUT;
        xmode |= ENABLE_PROCESSED_INPUT; // Control+C for SIGINT
        if( SetConsoleMode(hStdin,xmode) ){
            return tmode;
        }
    }
    return 0;
}
int setTermMode(int tmode){
    HANDLE hStdin = GetStdHandle(STD_INPUT_HANDLE);
    SetConsoleMode(hStdin,tmode);
    return 0;
}
#else
int setTermRaw(){
    return -1;
}
int setTermMode(int tmode){
    return 0;
}
#endif
*/
import "C"

/*
// // 2020-0906 added,
// // <a href="https://golang.org/cmd/cgo/">CGo</a>
// #include "poll.h" // <poll.h> // </poll.h> to be closed as HTML tag :-p
// typedef struct { struct pollfd fdv[8]; } pollFdv;
// int pollx(pollFdv *fdv, int nfds, int timeout){
//  return poll(fdv->fdv,nfds,timeout);
// }
import "C"

// 2020-1021 replaced poll() with channel/select
// // 2020-0906 added,
func CFpollIn1(fp*os.File, timeoutUs int)(ready uintptr){
    var fdv = C.pollFdv{}
    var nfds = 1
    var timeout = timeoutUs/1000

    fdv.fdv[0].fd = C.int(fp.Fd())
    fdv.fdv[0].events = C.POLLIN
    if( 0 < EventRecvFd ){
        fdv.fdv[1].fd = C.int(EventRecvFd)
        fdv.fdv[1].events = C.POLLIN
        nfds += 1
    }
    r := C.pollx(&fdv,C.int(nfds),C.int(timeout))
    if( r <= 0 ){
        return 0
    }
    if (int(fdv.fdv[1].revents) & int(C.POLLIN)) != 0 {
        //fprintf(stderr,"--De-- got Event\n");
        return uintptr(EventFdOffset + fdv.fdv[1].fd)
    }
    if (int(fdv.fdv[0].revents) & int(C.POLLIN)) != 0 {
        return uintptr(NormalFdOffset + fdv.fdv[0].fd)
    }
    return 0
}
```

```
*/

const (
    NAME = "gsh"
    VERSION = "0.7.3"
    DATE = "2020-10-22"
    AUTHOR = "SatoxITS(^~^)//"
)
var (
    GSH_HOME = ".gsh"   // under home directory
    GSH_PORT = 9999
    MaxStreamSize = int64(128*1024*1024*1024) // 128GiB is too large?
    PROMPT = "> "
    LINESIZE = (8*1024)
    PATHSEP = ":"   // should be ";" in Windows
    DIRSEP = "/"    // canbe \ in Windows
    OnWindows = false;
)
func initGshEnv(){
    if( runtime.GOOS == "windows" ){
        PATHSEP = ";";
        DIRSEP = "\\";
        OnWindows = true;
    }else{
    }
}

// -xX logging control
// --A-- all
// --I-- info.
// --D-- debug
// --T-- time and resource usage
// --W-- warning
// --E-- error
// --F-- fatal error
// --Xn- network

// <a name="struct">Structures</a>

// 2020-1022 Unix/Windows
// ----------------------
//type aStat_t syscall.Stat_t;
//type aStat_t struct { syscall.Stat_t }
type aStat_t struct {
    Size    int64
    Mode    os.FileMode
    Rdev    int64
    Blocks  int64
    Nlink   int64
}
func aLstat(path string, astat *aStat_t)(error){
    /*
    sstat := syscall.Stat_t{};
    err := syscall.Lstat(path,&sstat);
    *astat = aStat_t(sstat);
    */
    fi,err := os.Stat(path);
    if( err == nil ){
        astat.Mode = fi.Mode();
        astat.Size = fi.Size();
    }
    return err;
}

func aFstat(fd int, astat *aStat_t)(error){
    /*
    sstat := syscall.Stat_t{};
    err := syscall.Fstat(fd,&sstat);
    *astat = aStat_t(sstat);
    */
    err := errors.New("NotImplemented-Fstat");
    //fmt.Printf("---E-- fstat(%v)(%v)\n",fd,err);
    return err;
}
func aAccess(path string, mode uint32)(error){
    //err := syscall.Access(path,mode);
    //err := errors.New("NotImplemented-Access");
    fi,err := os.Stat(path)
    //fmt.Printf("-- Access(%v,%v)\n(%v)\n",path,mode,err);
    if( err == nil ){
        fmode := fi.Mode();
        if( fmode.IsRegular() ){
            perm := fmode.Perm();
            if( (uint32(perm) & mode) != 0 ){
                return nil;
            }
            return errors.New("NotAccessible");
        }
        return errors.New("NotRegularFile");
    }
    return err;
}

// 2020-1022 Unix/Windows
// ----------------------
type aRusage struct {
    syscall.Rusage
    Utime       time.Duration
    Stime       time.Duration
    //Sys       interface{}
}

/*
const aRUSAGE_SELF = syscall.RUSAGE_SELF
const aRUSAGE_CHILDREN = syscall.RUSAGE_CHILDREN
*/
const aRUSAGE_SELF = 0
const aRUSAGE_CHILDREN = 1
func aGetrusage(sel int, ru *aRusage){
/*
    sysru := syscall.Rusage{};
    syscall.Getrusage(sel,&sysru);
    ru.Utime = time.Duration(int64(sysru.Utime.Sec)*1000000000+int64(sysru.Utime.Usec)*1000);
    ru.Stime = time.Duration(int64(sysru.Stime.Sec)*1000000000+int64(sysru.Stime.Usec)*1000);
*/
}
func aSetrusage(ru *aRusage, ps *os.ProcessState){
    ru.Utime = ps.UserTime();
    ru.Stime = ps.SystemTime();
}
func showRusage(what string,argv []string, ru *aRusage){
    fmt.Printf("%s: ",what);
    //fmt.Printf("Usr=%d.%06ds",ru.Utime.Sec,ru.Utime.Usec)
    //fmt.Printf(" Sys=%d.%06ds",ru.Stime.Sec,ru.Stime.Usec)
    fmt.Printf("Usr=%d.%06ds ",ru.Utime/1000000000,(ru.Utime/1000)%1000000);
    fmt.Printf(" Sys=%d.%06ds ",ru.Stime/1000000000,(ru.Stime/1000)%1000000);
/*
    fmt.Printf(" Rss=%vB",ru.Maxrss)
    if isin("-l",argv) {
        fmt.Printf(" MinFlt=%v",ru.Minflt)
        fmt.Printf(" MajFlt=%v",ru.Majflt)
        fmt.Printf(" IxRSS=%vB",ru.Ixrss)
        fmt.Printf(" IdRSS=%vB",ru.Idrss)
        fmt.Printf(" Nswap=%vB",ru.Nswap)
    fmt.Printf(" Read=%v",ru.Inblock)
    fmt.Printf(" Write=%v",ru.Oublock)
    }
    fmt.Printf(" Snd=%v",ru.Msgsnd)
    fmt.Printf(" Rcv=%v",ru.Msgrcv)
    //if isin("-l",argv) {
        fmt.Printf(" Sig=%v",ru.Nsignals)
    //}
*/
    fmt.Printf("\n");
}

type GCommandHistory struct {
    StartAt     time.Time // command line execution started at
    EndAt       time.Time // command line execution ended at
    ResCode     int       // exit code of (external command)
    CmdError    error     // error string
    OutData     *os.File  // output of the command
    FoundFile   []string  // output - result of ufind
    Rusagev     [2]aRusage // Resource consumption, CPU time or so
    CmdId       int       // maybe with identified with arguments or impact
                          // redireciton commands should not be the CmdId
    WorkDir     string    // working directory at start
    WorkDirX    int       // index in ChdirHistory
    CmdLine     string    // command line
}
type GChdirHistory struct {
    Dir     string
```

```
    MovedAt     time.Time
    CmdIndex    int
}
type CmdMode struct {
    BackGround  bool
}
type Event struct {
    when        time.Time
    event       int
    evarg       int64
    CmdIndex    int
}
var CmdIndex int
var Events []Event
type PluginInfo struct {
    Spec        *plugin.Plugin
    Addr        plugin.Symbol
    Name        string // maybe relative
    Path        string // this is in Plugin but hidden
}
type GServer struct {
    host        string
    port        string
}

// <a href="https://tools.ietf.org/html/rfc3230">Digest</a>
const ( // SumType
    SUM_ITEMS   = 0x000001 // items count
    SUM_SIZE    = 0x000002 // data length (simplly added)
    SUM_SIZEHASH    = 0x000004 // data length (hashed sequence)
    SUM_DATEHASH    = 0x000008 // date of data (hashed sequence)
    // also envelope attributes like time stamp can be a part of digest
    // hashed value of sizes or mod-date of files will be useful to detect changes

    SUM_WORDS   = 0x000010 // word count is a kind of digest
    SUM_LINES   = 0x000020 // line count is a kind of digest
    SUM_SUM64   = 0x000040 // simple add of bytes, useful for human too

    SUM_SUM32_BITS  = 0x000100 // the number of true bits
    SUM_SUM32_2BYTE = 0x000200 // 16bits words
    SUM_SUM32_4BYTE = 0x000400 // 32bits words
    SUM_SUM32_8BYTE = 0x000800 // 64bits words

    SUM_SUM16_BSD   = 0x001000 // UNIXsum -sum -bsd
    SUM_SUM16_SYSV  = 0x002000 // UNIXsum -sum -sysv
    SUM_UNIXFILE    = 0x004000
    SUM_CRCIEEE = 0x008000
)
type CheckSum struct {
    Files       int64   // the number of files (or data)
    Size        int64   // content size
    Words       int64   // word count
    Lines       int64   // line count
    SumType     int
    Sum64       uint64
    Crc32Table  crc32.Table
    Crc32Val    uint32
    Sum16       int
    Ctime       time.Time
    Atime       time.Time
    Mtime       time.Time
    Start       time.Time
    Done        time.Time
    RusgAtStart [2]aRusage
    RusgAtEnd   [2]aRusage
}
type ValueStack [][]string
type GshContext struct {
    StartDir    string  // the current directory at the start
    GetLine     string  // gsh-getline command as a input line editor
    ChdirHistory    []GChdirHistory // the 1st entry is wd at the start
    //gshPA     syscall.ProcAttr
    gshPA       os.ProcAttr
    CommandHistory  []GCommandHistory
    CmdCurrent  GCommandHistory
    BackGround  bool
    BackGroundJobs  []os.ProcessState; //[]int
    LastRusage  aRusage
    GshHomeDir  string
    TerminalId  int
    CmdTrace    bool // should be [map]
    CmdTime     bool // should be [map]
    PluginFuncs []PluginInfo
    iValues     []string
    iDelimiter  string // field sepearater of print out
    iFormat     string // default print format (of integer)
    iValStack   ValueStack
    LastServer  GServer
    RSERV       string // [gsh://]host[:port]
    RWD     string // remote (target, there) working directory
    lastCheckSum    CheckSum
}

func nsleep(ns time.Duration){
    time.Sleep(ns)
}
func usleep(ns time.Duration){
    nsleep(ns*1000)
}
func msleep(ns time.Duration){
    nsleep(ns*1000000)
}
func sleep(ns time.Duration){
    nsleep(ns*1000000000)
}

func strBegins(str, pat string)(bool){
    if len(pat) <= len(str){
        yes := str[0:len(pat)] == pat
        //fmt.Printf("--D-- strBegins(%v,%v)=%v\n",str,pat,yes)
        return yes
    }
    //fmt.Printf("--D-- strBegins(%v,%v)=%v\n",str,pat,false)
    return false
}
func isin(what string, list []string) bool {
    for _, v := range list  {
        if v == what {
            return true
        }
    }
    return false
}
func isinX(what string,list[]string)(int){
    for i,v := range list {
        if v == what {
            return i
        }
    }
    return -1
}

func env(opts []string) {
    env := os.Environ()
    if isin("-s", opts){
        sort.Slice(env, func(i,j int) bool {
            return env[i] < env[j]
        })
    }
    for _, v := range env {
        fmt.Printf("%v\n",v)
    }
}

// - rewriting should be context dependent
// - should postpone until the real point of evaluation
// - should rewrite only known notation of symobl
func scanInt(str string)(val int,leng int){
    leng = -1
    for i,ch := range str {
        if '0' <= ch && ch <= '9' {
            leng = i+1
        }else{
            break
        }
    }
    if 0 < leng {
        ival,_ := strconv.Atoi(str[0:leng])
        return ival,leng
    }else{
        return 0,0
    }
```

```
}
func substHistory(gshCtx *GshContext,str string,i int,rstr string)(leng int,rst string){
    if len(str[i+1:]) == 0 {
        return 0,rstr
    }
    hi := 0
    histlen := len(gshCtx.CommandHistory)
    if str[i+1] == '!' {
        hi = histlen - 1
        leng = 1
    }else{
        hi,leng = scanInt(str[i+1:])
        if leng == 0 {
            return 0,rstr
        }
        if hi < 0 {
            hi = histlen + hi
        }
    }
    if 0 <= hi && hi < histlen {
        var ext byte
        if 1 < len(str[i+leng:]) {
            ext = str[i+leng:][1]
        }
        //fmt.Printf("--D-- %v(%c)\n",str[i+leng:],str[i+leng])
        if ext == 'f' {
            leng += 1
            xlist := []string{}
            list := gshCtx.CommandHistory[hi].FoundFile
            for _,v := range list {
                //list[i] = escapeWhiteSP(v)
                xlist = append(xlist,escapeWhiteSP(v))
            }
            //rstr += strings.Join(list," ")
            rstr += strings.Join(xlist," ")
        }else
        if ext == '@' || ext == 'd' {
            // !N@ .. workdir at the start of the command
            leng += 1
            rstr += gshCtx.CommandHistory[hi].WorkDir
        }else{
            rstr += gshCtx.CommandHistory[hi].CmdLine
        }
    }else{
        leng = 0
    }
    return leng,rstr
}
func escapeWhiteSP(str string)(string){
    if len(str) == 0 {
        return "\\z" // empty, to be ignored
    }
    rstr := ""
    for _,ch := range str {
        switch ch {
            case '\\': rstr += "\\\\"
            case ' ': rstr += "\\s"
            case '\t': rstr += "\\t"
            case '\r': rstr += "\\r"
            case '\n': rstr += "\\n"
            default: rstr += string(ch)
        }
    }
    return rstr
}
func unescapeWhiteSP(str string)(string){ // strip original escapes
    rstr := ""
    for i := 0; i < len(str); i++ {
        ch := str[i]
        if ch == '\\' {
            if i+1 < len(str) {
                switch str[i+1] {
                    case 'z':
                        continue;
                }
            }
        }
        rstr += string(ch)
    }
    return rstr
}
func unescapeWhiteSPV(strv []string)([]string){ // strip original escapes
    ustrv := []string{}
    for _,v := range strv {
        ustrv = append(ustrv,unescapeWhiteSP(v))
    }
    return ustrv
}

// <a name="comexpansion">str-expansion</a>
// - this should be a macro processor
func strsubst(gshCtx *GshContext,str string,histonly bool) string {
    rbuff := []byte{}
    if false {
        //@@U Unicode should be cared as a character
        return str
    }
    //rstr := ""
    inEsc := 0 // escape character mode
    for i := 0; i < len(str); i++ {
        //fmt.Printf("--D--Subst %v:%v\n",i,str[i:])
        ch := str[i]
        if inEsc == 0 {
            if ch == '!' {
                //leng,xrstr := substHistory(gshCtx,str,i,rstr)
                leng,rs := substHistory(gshCtx,str,i,"")
                if 0 < leng {
//_,rs := substHistory(gshCtx,str,i,"")
rbuff = append(rbuff,[]byte(rs)...)
                    i += leng
                    //rstr = xrstr
                    continue
                }
            }
            switch ch {
                case '\\': inEsc = '\\'; continue
                //case '%':  inEsc = '%';  continue
                case '$':
            }
        }
        switch inEsc {
        case '\\':
            switch ch {
                case '\\': ch = '\\'
                case 's': ch = ' '
                case 't': ch = '\t'
                case 'r': ch = '\r'
                case 'n': ch = '\n'
                case 'z': inEsc = 0; continue // empty, to be ignored
            }
            inEsc = 0
        case '%':
            switch {
                case ch == '%': ch = '%'
                case ch == 'T':
                    //rstr = rstr + time.Now().Format(time.Stamp)
rs := time.Now().Format(time.Stamp)
rbuff = append(rbuff,[]byte(rs)...)
                    inEsc = 0
                    continue;
                default:
                    // postpone the interpretation
                    //rstr = rstr + "%" + string(ch)
rbuff = append(rbuff,ch)
                    inEsc = 0
                    continue;
            }
            inEsc = 0
        }
        //rstr = rstr + string(ch)
        rbuff = append(rbuff,ch)
    }
    //fmt.Printf("--D--subst(%s)(%s)\n",str,string(rbuff))
    return string(rbuff)
    //return rstr
}
func showFileInfo(path string, opts []string) {
    if isin("-l",opts) || isin("-ls",opts) {
        fi, err := os.Stat(path)
        if err != nil {
            fmt.Printf("---------- ((%v))",err)
        }else{
```

```
            mod := fi.ModTime()
            date := mod.Format(time.Stamp)
            fmt.Printf("%v %8v %s ",fi.Mode(),fi.Size(),date)
        }
    }
    fmt.Printf("%s",path)
    if isin("-sp",opts) {
        fmt.Printf(" ")
    }else
    if ! isin("-n",opts) {
        fmt.Printf("\n")
    }
}
func userHomeDir()(string,bool){
    /*
    homedir,_ = os.UserHomeDir() // not implemented in older Golang
    */
    homedir,found := os.LookupEnv("HOME")
    //fmt.Printf("--I-- HOME=%v(%v)\n",homedir,found)
    if !found {
        return "/tmp",found
    }
    return homedir,found
}

func toFullpath(path string) (fullpath string) {
    if path[0] == '/' {
        return path
    }
    pathv := strings.Split(path,DIRSEP)
    switch {
    case pathv[0] == ".":
        pathv[0], _ = os.Getwd()
    case pathv[0] == "..": // all ones should be interpreted
        cwd, _ := os.Getwd()
        ppathv := strings.Split(cwd,DIRSEP)
        pathv[0] = strings.Join(ppathv,DIRSEP)
    case pathv[0] == "~":
        pathv[0],_ = userHomeDir()
    default:
        cwd, _ := os.Getwd()
        pathv[0] = cwd + DIRSEP + pathv[0]
    }
    return strings.Join(pathv,DIRSEP)
}

func IsRegFile(path string)(bool){
    fi, err := os.Stat(path)
    if err == nil {
        fm := fi.Mode()
        return fm.IsRegular();
    }
    return false
}

// <a name="encode">Encode / Decode</a>
// <a href="https://golang.org/pkg/encoding/base64/#example_NewEncoder">Encoder</a>
func (gshCtx *GshContext)Enc(argv[]string){
    file := os.Stdin
    buff := make([]byte,LINESIZE)
    li := 0
    encoder := base64.NewEncoder(base64.StdEncoding,os.Stdout)
    for li = 0; ; li++ {
        count, err := file.Read(buff)
        if count <= 0 {
            break
        }
        if err != nil {
            break
        }
        encoder.Write(buff[0:count])
    }
    encoder.Close()
}
func (gshCtx *GshContext)Dec(argv[]string){
    decoder := base64.NewDecoder(base64.StdEncoding,os.Stdin)
    li := 0
    buff := make([]byte,LINESIZE)
    for li = 0; ; li++ {
        count, err := decoder.Read(buff)
        if count <= 0 {
            break
        }
        if err != nil {
            break
        }
        os.Stdout.Write(buff[0:count])
    }
}
// lnsp [N] [-crlf][-C \\]
func (gshCtx *GshContext)SplitLine(argv[]string){
    strRep := isin("-str",argv) // "..."+
    reader := bufio.NewReaderSize(os.Stdin,64*1024)
    ni := 0
    toi := 0
    for ni = 0; ; ni++ {
        line, err := reader.ReadString('\n')
        if len(line) <= 0 {
            if err != nil {
            fmt.Fprintf(os.Stderr,"--I-- lnsp %d to %d (%v)\n",ni,toi,err)
            break
            }
        }
        off := 0
        ilen := len(line)
        remlen := len(line)
        if strRep { os.Stdout.Write([]byte("\"")) }
        for oi := 0; 0 < remlen; oi++ {
            olen := remlen
            addnl := false
            if 72 < olen {
                olen = 72
                addnl = true
            }
            fmt.Fprintf(os.Stderr,"--D-- write %d [%d.%d] %d %d/%d/%d\n",
                toi,ni,oi,off,olen,remlen,ilen)
            toi += 1
            os.Stdout.Write([]byte(line[0:olen]))
            if addnl {
                if strRep {
                    os.Stdout.Write([]byte("\"+\n\""))
                }else{
                    //os.Stdout.Write([]byte("\r\n"))
                    os.Stdout.Write([]byte("\\"))
                    os.Stdout.Write([]byte("\n"))
                }
            }
            line = line[olen:]
            off += olen
            remlen -= olen
        }
        if strRep { os.Stdout.Write([]byte("\"\n")) }
    }
    fmt.Fprintf(os.Stderr,"--I-- lnsp %d to %d\n",ni,toi)
}

// CRC32 <a href="http://golang.jp/pkg/hash-crc32">crc32</a>
// 1 0000 0100 1100 0001 0001 1101 1011 0111
var CRC32UNIX uint32 = uint32(0x04C11DB7) // Unix cksum
var CRC32IEEE uint32 = uint32(0xEDB88320)
func byteCRC32add(crc uint32,str[]byte,len uint64)(uint32){
    var oi uint64
    for oi = 0; oi < len; oi++ {
        var oct = str[oi]
        for bi := 0; bi < 8; bi++ {
            //fprintf(stderr,"--CRC32 %d %X (%d.%d)\n",crc,oct,oi,bi)
            ovf1 := (crc & 0x80000000) != 0
            ovf2 := (oct & 0x80) != 0
            ovf := (ovf1 && !ovf2) || (!ovf1 && ovf2)
            oct <<= 1
            crc <<= 1
            if ovf { crc ^= CRC32UNIX }
        }
    }
    //fprintf(stderr,"--CRC32 return %d %d\n",crc,len)
    return crc;
}
func byteCRC32end(crc uint32, len uint64)(uint32){
    var slen = make([]byte,4)
    var li = 0
        for li = 0; li < 4; {
                slen[li] = byte(len)
```

```
        li += 1
                len >>= 8
                if( len == 0 ){
                        break
        }
        }
        crc = byteCRC32add(crc,slen,uint64(li))
        crc ^= 0xFFFFFFFF
        return crc
}
func strCRC32(str string,len uint64)(crc uint32){
    crc = byteCRC32add(0,[]byte(str),len)
    crc = byteCRC32end(crc,len)
    //fprintf(stderr,"--CRC32 %d %d\n",crc,len)
    return crc
}
func CRC32Finish(crc uint32, table *crc32.Table, len uint64)(uint32){
    var slen = make([]byte,4)
    var li = 0
        for li = 0; li < 4; {
                slen[li] = byte(len & 0xFF)
        li += 1
                len >>= 8
                if( len == 0 ){
                        break
        }
        }
    crc = crc32.Update(crc,table,slen)
        crc ^= 0xFFFFFFFF
        return crc
}

func (gsh*GshContext)xCksum(path string,argv[]string, sum*CheckSum)(int64){
    if isin("-type/f",argv) && !IsRegFile(path){
        return 0
    }
    if isin("-type/d",argv) && IsRegFile(path){
        return 0
    }
    file, err := os.OpenFile(path,os.O_RDONLY,0)
    if err != nil {
        fmt.Printf("--E-- cksum %v (%v)\n",path,err)
        return -1
    }
    defer file.Close()
    if gsh.CmdTrace { fmt.Printf("--I-- cksum %v %v\n",path,argv) }

    bi := 0
    var buff = make([]byte,32*1024)
    var total int64 = 0
    var initTime = time.Time{}
    if sum.Start == initTime {
        sum.Start = time.Now()
    }
    for bi = 0; ; bi++ {
        count,err := file.Read(buff)
        if count <= 0 || err != nil {
            break
        }
        if (sum.SumType & SUM_SUM64) != 0 {
            s := sum.Sum64
            for _,c := range buff[0:count] {
                s += uint64(c)
            }
            sum.Sum64 = s
        }
        if (sum.SumType & SUM_UNIXFILE) != 0 {
            sum.Crc32Val = byteCRC32add(sum.Crc32Val,buff,uint64(count))
        }
        if (sum.SumType & SUM_CRCIEEE) != 0 {
            sum.Crc32Val = crc32.Update(sum.Crc32Val,&sum.Crc32Table,buff[0:count])
        }
        // <a href="https://en.wikipedia.org/wiki/BSD_checksum">BSD checksum</a>
        if (sum.SumType & SUM_SUM16_BSD) != 0 {
            s := sum.Sum16
            for _,c := range buff[0:count] {
                s = (s >> 1) + ((s & 1) << 15)
                s += int(c)
                s &= 0xFFFF
                //fmt.Printf("BSDsum: %d[%d] %d\n",sum.Size+int64(i),i,s)
            }
            sum.Sum16 = s
        }
        if (sum.SumType & SUM_SUM16_SYSV) != 0 {
            for bj := 0; bj < count; bj++ {
                sum.Sum16 += int(buff[bj])
            }
        }
        total += int64(count)
    }
    sum.Done = time.Now()
    sum.Files += 1
    sum.Size += total
    if !isin("-s",argv) {
        fmt.Printf("%v ",total)
    }
    return 0
}

// <a name="grep">grep</a>
// "lines", "lin" or "lnp" for "(text) line processor" or "scanner"
// a*,!ab,c, ... sequentioal combination of patterns
// what "LINE" is should be definable
// generic line-by-line processing
// grep [-v]
// cat -n -v
// uniq [-c]
// tail -f
// sed s/x/y/ or awk
// grep with line count like wc
// rewrite contents if specified
func (gsh*GshContext)xGrep(path string,rexpv[]string)(int){
    file, err := os.OpenFile(path,os.O_RDONLY,0)
    if err != nil {
        fmt.Printf("--E-- grep %v (%v)\n",path,err)
        return -1
    }
    defer file.Close()
    if gsh.CmdTrace { fmt.Printf("--I-- grep %v %v\n",path,rexpv) }
    //reader := bufio.NewReaderSize(file,LINESIZE)
    reader := bufio.NewReaderSize(file,80)
    li := 0
    found := 0
    for li = 0; ; li++ {
        line, err := reader.ReadString('\n')
        if len(line) <= 0 {
            break
        }
        if 150 < len(line) {
            // maybe binary
            break;
        }
        if err != nil {
            break
        }
        if 0 <= strings.Index(string(line),rexpv[0]) {
            found += 1
            fmt.Printf("%s:%d: %s",path,li,line)
        }
    }
        //fmt.Printf("total %d lines %s\n",li,path)
    //if( 0 < found ){ fmt.Printf("((found %d lines %s))\n",found,path); }
    return found
}

// <a name="finder">Finder</a>
// finding files with it name and contents
// file names are ORed
// show the content with %x fmt list
// ls -R
// tar command by adding output
type fileSum struct {
    Err int64   // access error or so
    Size    int64   // content size
    DupSize int64   // content size from hard links
    Blocks  int64   // number of blocks (of 512 bytes)
    DupBlocks int64 // Blocks pointed from hard links
    HLinks  int64   // hard links
    Words   int64
    Lines   int64
    Files   int64
    Dirs    int64   // the num. of directories
```

```
    SymLink int64
    Flats   int64  // the num. of flat files
    MaxDepth    int64
    MaxNamlen   int64  // max. name length
    nextRepo    time.Time
}
func showFusage(dir string,fusage *fileSum){
    bsume := float64(((fusage.Blocks-fusage.DupBlocks)/2)*1024)/1000000.0
    //bsumdup := float64((fusage.Blocks/2)*1024)/1000000.0

    fmt.Printf("%v: %v files (%vd %vs %vh) %.6f MB (%.2f MBK)\n",
        dir,
        fusage.Files,
        fusage.Dirs,
        fusage.SymLink,
        fusage.HLinks,
        float64(fusage.Size)/1000000.0,bsume);
}
const (
    S_IFMT    = 0170000
    S_IFCHR   = 0020000
    S_IFDIR   = 0040000
    S_IFREG   = 0100000
    S_IFLNK   = 0120000
    S_IFSOCK  = 0140000
)
func cumFinfo(fsum *fileSum, path string, staterr error, fstat aStat_t, argv[]string,verb bool)(*fileSum){
    now := time.Now()
    if time.Second <= now.Sub(fsum.nextRepo) {
        if !fsum.nextRepo.IsZero(){
            tstmp := now.Format(time.Stamp)
            showFusage(tstmp,fsum)
        }
        fsum.nextRepo = now.Add(time.Second)
    }
    if staterr != nil {
        fsum.Err += 1
        return fsum
    }
    fsum.Files += 1
    if 1 < fstat.Nlink {
        // must count only once...
        // at least ignore ones in the same directory
        //if finfo.Mode().IsRegular() {
        if (fstat.Mode & S_IFMT) == S_IFREG {
            fsum.HLinks += 1
            fsum.DupBlocks += int64(fstat.Blocks)
            //fmt.Printf("---Dup HardLink %v %s\n",fstat.Nlink,path)
        }
    }
    //fsum.Size += finfo.Size()
    fsum.Size += fstat.Size
    fsum.Blocks += int64(fstat.Blocks)
    //if verb { fmt.Printf("(%8dBlk) %s",fstat.Blocks/2,path) }
    if isin("-ls",argv){
        //if verb { fmt.Printf("%4d %8d ",fstat.Blksize,fstat.Blocks) }
//      fmt.Printf("%d\t",fstat.Blocks/2)
    }
    //if finfo.IsDir()
    if (fstat.Mode & S_IFMT) == S_IFDIR {
        fsum.Dirs += 1
    }
    //if (finfo.Mode() & os.ModeSymlink) != 0
    if (fstat.Mode & S_IFMT) == S_IFLNK {
        //if verb { fmt.Printf("symlink(%v,%s)\n",fstat.Mode,finfo.Name()) }
        //{ fmt.Printf("symlink(%o,%s)\n",fstat.Mode,finfo.Name()) }
        fsum.SymLink += 1
    }
    return fsum
}
func (gsh*GshContext)xxFindEntv(depth int,total *fileSum,dir string, dstat aStat_t, ei int, entv []string,npatv[]string,argv[]string)(*fileSum){
    nols := isin("-grep",argv)
    // sort entv
    /*
    if isin("-t",argv){
        sort.Slice(filev, func(i,j int) bool {
            return 0 < filev[i].ModTime().Sub(filev[j].ModTime())
        })
    }
    */
        /*
        if isin("-u",argv){
            sort.Slice(filev, func(i,j int) bool {
                return 0 < filev[i].AccTime().Sub(filev[j].AccTime())
            })
        }
        if isin("-U",argv){
            sort.Slice(filev, func(i,j int) bool {
                return 0 < filev[i].CreatTime().Sub(filev[j].CreatTime())
            })
        }
        */
    /*
    if isin("-S",argv){
        sort.Slice(filev, func(i,j int) bool {
            return filev[j].Size() < filev[i].Size()
        })
    }
    */
    for _,filename := range entv {
        for _,npat := range npatv {
            match := true
            if npat == "*" {
                match = true
            }else{
                match, _ = filepath.Match(npat,filename)
            }
            path := dir + DIRSEP + filename
            if !match {
                continue
            }
            var fstat aStat_t
            staterr := aLstat(path,&fstat)
            if staterr != nil {
                if !isin("-w",argv){fmt.Printf("ufind: %v\n",staterr) }
                continue;
            }
            if isin("-du",argv) && (fstat.Mode & S_IFMT) == S_IFDIR {
                // should not show size of directory in "-du" mode ...
            }else
            if !nols && !isin("-s",argv) && (!isin("-du",argv) || isin("-a",argv)) {
                if isin("-du",argv) {
                    fmt.Printf("%d\t",fstat.Blocks/2)
                }
                showFileInfo(path,argv)
            }
            if true { // && isin("-du",argv)
                total = cumFinfo(total,path,staterr,fstat,argv,false)
            }
            /*
            if isin("-wc",argv) {
            }
            */
            if gsh.lastCheckSum.SumType != 0 {
                gsh.xCksum(path,argv,&gsh.lastCheckSum);
            }
            x := isinX("-grep",argv); // -grep will be convenient like -ls
            if 0 <= x && x+1 <= len(argv) { // -grep will be convenient like -ls
                if IsRegFile(path){
                    found := gsh.xGrep(path,argv[x+1:])
                    if 0 < found {
                        foundv := gsh.CmdCurrent.FoundFile
                        if len(foundv) < 10 {
                            gsh.CmdCurrent.FoundFile =
                            append(gsh.CmdCurrent.FoundFile,path)
                        }
                    }
                }
            }
            if !isin("-r0",argv) { // -d 0 in du, -depth n in find
                //total.Depth += 1
                if (fstat.Mode & S_IFMT) == S_IFLNK {
                    continue
                }
                if dstat.Rdev != fstat.Rdev {
                    fmt.Printf("--I-- don't follow differnet device %v(%v) %v(%v)\n",
                        dir,dstat.Rdev,path,fstat.Rdev)
                }
                if (fstat.Mode & S_IFMT) == S_IFDIR {
                    total = gsh.xxFind(depth+1,total,path,npatv,argv)
                }
            }
```

```
        }
    }
    return total
}
func (gsh*GshContext)xxFind(depth int,total *fileSum,dir string,npatv[]string,argv[]string)(*fileSum){
    nols := isin("-grep",argv)
    dirfile,oerr := os.OpenFile(dir,os.O_RDONLY,0)
    if oerr == nil {
        //fmt.Printf("--I-- %v(%v)[%d]\n",dir,dirfile,dirfile.Fd())
        defer dirfile.Close()
    }else{
    }

    prev := *total
    var dstat aStat_t
    staterr := aLstat(dir,&dstat) // should be flstat

    if staterr != nil {
        if !isin("-w",argv){ fmt.Printf("ufind: %v\n",staterr) }
        return total
    }
        //filev,err := ioutil.ReadDir(dir)
        //_,err := ioutil.ReadDir(dir) // ReadDir() heavy and bad for huge directory
        /*
        if err != nil {
            if !isin("-w",argv){ fmt.Printf("ufind: %v\n",err) }
            return total
        }
        */
    if depth == 0 {
        total = cumFinfo(total,dir,staterr,dstat,argv,true)
        if !nols && !isin("-s",argv) && (!isin("-du",argv) || isin("-a",argv)) {
            showFileInfo(dir,argv)
        }
    }
    // it it is not a directory, just scan it and finish

    for ei := 0; ; ei++ {
        entv,rderr := dirfile.Readdirnames(8*1024)
        if len(entv) == 0 || rderr != nil {
            //if rderr != nil { fmt.Printf("[%d] len=%d (%v)\n",ei,len(entv),rderr) }
            break
        }
        if 0 < ei {
            fmt.Printf("--I-- xxFind[%d] %d large-dir: %s\n",ei,len(entv),dir)
        }
        total = gsh.xxFindEntv(depth,total,dir,dstat,ei,entv,npatv,argv)
    }
    if isin("-du",argv) {
        // if in "du" mode
        fmt.Printf("%d\t%s\n",(total.Blocks-prev.Blocks)/2,dir)
    }
    return total
}

// {ufind|fu|ls} [Files] [// Names] [-- Expressions]
//  Files is "." by default
//  Names is "*" by default
//  Expressions is "-print" by default for "ufind", or -du for "fu" command
func (gsh*GshContext)xFind(argv[]string){
    if 0 < len(argv) && strBegins(argv[0],"?"){
        showFound(gsh,argv)
        return
    }
    if isin("-cksum",argv) || isin("-sum",argv) {
        gsh.lastCheckSum = CheckSum{}
        if isin("-sum",argv) && isin("-add",argv) {
            gsh.lastCheckSum.SumType |= SUM_SUM64
        }else
        if isin("-sum",argv) && isin("-size",argv) {
            gsh.lastCheckSum.SumType |= SUM_SIZE
        }else
        if isin("-sum",argv) && isin("-bsd",argv) {
            gsh.lastCheckSum.SumType |= SUM_SUM16_BSD
        }else
        if isin("-sum",argv) && isin("-sysv",argv) {
            gsh.lastCheckSum.SumType |= SUM_SUM16_SYSV
        }else
        if isin("-sum",argv) {
            gsh.lastCheckSum.SumType |= SUM_SUM64
        }
        if isin("-unix",argv) {
            gsh.lastCheckSum.SumType |= SUM_UNIXFILE
            gsh.lastCheckSum.Crc32Table = *crc32.MakeTable(CRC32UNIX)
        }
        if isin("-ieee",argv){
            gsh.lastCheckSum.SumType |= SUM_CRCIEEE
            gsh.lastCheckSum.Crc32Table = *crc32.MakeTable(CRC32IEEE)
        }
        gsh.lastCheckSum.RusgAtStart = Getrusagev()
    }
    var total = fileSum{}
    npats := []string{}
    for _,v := range argv {
        if 0 < len(v) && v[0] != '-' {
            npats = append(npats,v)
        }
        if v == "//" { break }
        if v == "--" { break }
        if v == "-grep" { break }
        if v == "-ls" { break }
    }
    if len(npats) == 0 {
        npats = []string{"*"}
    }
    cwd := "."
    // if to be fullpath ::: cwd, _ := os.Getwd()
    if len(npats) == 0 { npats = []string{"*"} }
    fusage := gsh.xxFind(0,&total,cwd,npats,argv)
    if gsh.lastCheckSum.SumType != 0 {
        var sumi uint64 = 0
        sum := &gsh.lastCheckSum
        if (sum.SumType & SUM_SIZE) != 0 {
            sumi = uint64(sum.Size)
        }
        if (sum.SumType & SUM_SUM64) != 0 {
            sumi = sum.Sum64
        }
        if (sum.SumType & SUM_SUM16_SYSV) != 0 {
            s := uint32(sum.Sum16)
            r := (s & 0xFFFF) + ((s & 0xFFFFFFFF) >> 16)
            s = (r & 0xFFFF) + (r >> 16)
            sum.Crc32Val = uint32(s)
            sumi = uint64(s)
        }
        if (sum.SumType & SUM_SUM16_BSD) != 0 {
            sum.Crc32Val = uint32(sum.Sum16)
            sumi = uint64(sum.Sum16)
        }
        if (sum.SumType & SUM_UNIXFILE) != 0 {
            sum.Crc32Val = byteCRC32end(sum.Crc32Val,uint64(sum.Size))
            sumi = uint64(byteCRC32end(sum.Crc32Val,uint64(sum.Size)))
        }
        if 1 < sum.Files {
            fmt.Printf("%v %v // %v / %v files, %v/file\r\n",
                sumi,sum.Size,
                abssize(sum.Size),sum.Files,
                abssize(sum.Size/sum.Files))
        }else{
            fmt.Printf("%v %v %v\n",
                sumi,sum.Size,npats[0])
        }
    }
    if !isin("-grep",argv) {
        showFusage("total",fusage)
    }
    if !isin("-s",argv){
        hits := len(gsh.CmdCurrent.FoundFile)
        if 0 < hits {
            fmt.Printf("--I-- %d files hits // can be refered with !%df\n",
                hits,len(gsh.CommandHistory))
        }
    }
    if gsh.lastCheckSum.SumType != 0 {
        if isin("-ru",argv) {
            sum := &gsh.lastCheckSum
            sum.Done = time.Now()
            gsh.lastCheckSum.RusgAtEnd = Getrusagev()
            elps := sum.Done.Sub(sum.Start)
            fmt.Printf("--cksum-size: %v (%v) / %v files, %v/file\r\n",
                sum.Size,abssize(sum.Size),sum.Files,abssize(sum.Size/sum.Files))
            nanos := int64(elps)
```

```
            dnanos := time.Duration(nanos);
            fmt.Printf("--cksum-time: %v/total, %v/file, %.1f files/s, %v\r\n",
                abbtime(dnanos),
                abbtime(time.Duration(nanos/sum.Files)),
                (float64(sum.Files)*1000000000.0)/float64(nanos),
                abbspeed(sum.Size,nanos))
            diff := RusageSubv(sum.RusgAtEnd,sum.RusgAtStart)
            fmt.Printf("--cksum-rusg: %v\n",sRusagef("",argv,diff))
        }
    }
    return
}

func showFiles(files[]string){
    sp := ""
    for i,file := range files {
        if 0 < i { sp = " " } else { sp = "" }
        fmt.Printf(sp+"%s",escapeWhiteSP(file))
    }
}
func showFound(gshCtx *GshContext, argv[]string){
    for i,v := range gshCtx.CommandHistory {
        if 0 < len(v.FoundFile) {
            fmt.Printf("!%d (%d) ",i,len(v.FoundFile))
            if isin("-ls",argv){
                fmt.Printf("\n")
                for _,file := range v.FoundFile {
                    fmt.Printf("") //sub number?
                    showFileInfo(file,argv)
                }
            }else{
                showFiles(v.FoundFile)
                fmt.Printf("\n")
            }
        }
    }
}

func showMatchFile(filev []os.FileInfo, npat,dir string, argv[]string)(string,bool){
    fname := ""
    found := false
    for _,v := range filev {
        match, _ := filepath.Match(npat,(v.Name()))
        if match {
            fname = v.Name()
            found = true
            //fmt.Printf("[%d] %s\n",i,v.Name())
            showIfExecutable(fname,dir,argv)
        }
    }
    return fname,found
}
func showIfExecutable(name,dir string,argv[]string)(ffullpath string,ffound bool){
    var fullpath string
    if strBegins(name,DIRSEP){
        fullpath = name
    }else
    if( len(dir) == 0 ){
        fullpath = name;
    }else{
        fullpath = dir + DIRSEP + name
    }
    fi, err := os.Stat(fullpath)
    //fmt.Printf("--Dp-- \"%v\"\n-- %v\n",fullpath,err);
    if err != nil {
        fullpath += ".exe";
        fi, err = os.Stat(fullpath)
    }
    if err != nil {
        fullpath = dir + DIRSEP + name + ".go"
        fi, err = os.Stat(fullpath)
    }
    if err == nil {
        fm := fi.Mode()
        if fm.IsRegular() {
          // R_OK=4, W_OK=2, X_OK=1, F_OK=0
          if aAccess(fullpath,5) == nil {
            ffullpath = fullpath
            ffound = true
            if ! isin("-s", argv) {
                showFileInfo(fullpath,argv)
            }
          }
        }
    }
    return ffullpath, ffound
}
func which(list string, argv []string) (fullpathv []string, itis bool){
    if len(argv) <= 1 {
        fmt.Printf("Usage: which comand [-s] [-a] [-ls]\n")
        return []string{""}, false
    }
    path := argv[1]
    if strBegins(path,"/") {
        // should check if excecutable?
        _,exOK := showIfExecutable(path,"/",argv)
        fmt.Printf("--D-- %v exOK=%v\n",path,exOK)
        return []string{path},exOK
    }
    pathenv, efound := os.LookupEnv(list)
    if ! efound {
        fmt.Printf("--E-- which: no \"%s\" environment\n",list)
        return []string{""}, false
    }
//fmt.Printf("PATH=%v\n",pathenv);
    showall := isin("-a",argv) || 0 <= strings.Index(path,"*")
    dirv := strings.Split(pathenv,PATHSEP)
    ffound := false
    ffullpath := path
    for _, dir := range dirv {
        if 0 <= strings.Index(path,"*") { // by wild-card
            list,_ := ioutil.ReadDir(dir)
            ffullpath, ffound = showMatchFile(list,path,dir,argv)
        }else{
            ffullpath, ffound = showIfExecutable(path,dir,argv)
        }
        //if ffound && !isin("-a", argv) {
        if ffound && !showall {
            break;
        }
    }
    return []string{ffullpath}, ffound
}

func stripLeadingWSParg(argv[]string)([]string){
    for ; 0 < len(argv); {
        if len(argv[0]) == 0 {
            argv = argv[1:]
        }else{
            break
        }
    }
    return argv
}
func xEval(argv []string, nlend bool){
    argv = stripLeadingWSParg(argv)
    if len(argv) == 0 {
        fmt.Printf("eval [%%format] [Go-expression]\n")
        return
    }
    pfmt := "%v"
    if argv[0][0] == '%' {
        pfmt = argv[0]
        argv = argv[1:]
    }
    if len(argv) == 0 {
        return
    }
    gocode := strings.Join(argv," ");
    //fmt.Printf("eval [%v] [%v]\n",pfmt,gocode)
    fset := token.NewFileSet()
    rval, _ := types.Eval(fset,nil,token.NoPos,gocode)
    fmt.Printf(pfmt,rval.Value)
    if nlend { fmt.Printf("\n") }
}

func getval(name string) (found bool, val int) {
    /* should expand the name here */
    if name == "gsh.pid" {
        return true, os.Getpid()
    }else
    if name == "gsh.ppid" {
```

```
        return true, os.Getppid()
    }
    return false, 0
}

func echo(argv []string, nlend bool){
    for ai := 1; ai < len(argv); ai++ {
        if 1 < ai {
            fmt.Printf(" ");
        }
        arg := argv[ai]
        found, val := getval(arg)
        if found {
            fmt.Printf("%d",val)
        }else{
            fmt.Printf("%s",arg)
        }
    }
    if nlend {
        fmt.Printf("\n");
    }
}

func resfile() string {
    return "gsh.tmp"
}
//var resF *File
func ressmap() {
    //_ , err := os.OpenFile(resfile(), os.O_RDWR|os.O_CREATE, os.ModeAppend)
    // https://developpaper.com/solution-to-golang-bad-file-descriptor-problem/
    _ , err := os.OpenFile(resfile(), os.O_RDWR|os.O_CREATE, 0600)
    if err != nil {
        fmt.Printf("refF could not open: %s\n",err)
    }else{
        fmt.Printf("refF opened\n")
    }
}

// @@2020-0821
func gshScanArg(str string,strip int)(argv []string){
    var si = 0
    var sb = 0
    var inBracket = 0
    var arg1 = make([]byte,LINESIZE)
    var ax = 0
    debug := false

    for ; si < len(str); si++ {
        if str[si] != ' ' {
            break
        }
    }
    sb = si
    for ; si < len(str); si++ {
        if sb <= si {
            if debug {
                fmt.Printf("--Da- +%d %2d-%2d %s ... %s\n",
                    inBracket,sb,si,arg1[0:ax],str[si:])
            }
        }
        ch := str[si]
        if ch  == '{' {
            inBracket += 1
            if 0 < strip && inBracket <= strip {
                //fmt.Printf("stripLEV %d <= %d?\n",inBracket,strip)
                continue
            }
        }
        if 0 < inBracket {
            if ch == '}' {
                inBracket -= 1
                if 0 < strip && inBracket < strip {
                    //fmt.Printf("stripLEV %d <  %d?\n",inBracket,strip)
                    continue
                }
            }
            arg1[ax] = ch
            ax += 1
            continue
        }
        if str[si] == ' ' {
            argv = append(argv,string(arg1[0:ax]))
            if debug {
                fmt.Printf("--Da- [%v][%v-%v] %s ... %s\n",
                    -1+len(argv),sb,si,str[sb:si],string(str[si:]))
            }
            sb = si+1
            ax = 0
            continue
        }
        arg1[ax] = ch
        ax += 1
    }
    if sb < si {
        argv = append(argv,string(arg1[0:ax]))
        if debug {
            fmt.Printf("--Da- [%v][%v-%v] %s ... %s\n",
                -1+len(argv),sb,si,string(arg1[0:ax]),string(str[si:]))
        }
    }
    if debug {
        fmt.Printf("--Da- %d [%s] => [%d]%v\n",strip,str,len(argv),argv)
    }
    return argv
}

// should get stderr (into tmpfile ?) and return
func (gsh*GshContext)Popen(name,mode string)(pin*os.File,pout*os.File,err bool){
    //var pv = [jint{-1,-1}
    //syscall.Pipe(pv)

    xarg := gshScanArg(name,1)
    name = strings.Join(xarg," ")

    //pin = os.NewFile(uintptr(pv[0]),"StdoutOf-{"+name+"}")
    //pout = os.NewFile(uintptr(pv[1]),"StdinOf-{"+name+"}")
    pin,pout,_ = os.Pipe();

    fdix := 0
    dir := "?"
    if mode == "r" {
        dir = "<"
        fdix = 1 // read from the stdout of the process
    }else{
        dir = ">"
        fdix = 0 // write to the stdin of the process
    }
    gshPA := gsh.gshPA
    savfd := gshPA.Files[fdix]

    var fd uintptr = 0
    if mode == "r" {
        //fd = pout.Fd()
        //gshPA.Files[fdix] = pout.Fd()
        gshPA.Files[fdix] = pout;
    }else{
        //fd = pin.Fd()
        //gshPA.Files[fdix] = pin.Fd()
        gshPA.Files[fdix] = pin;
    }
        // should do this by Goroutine?
        if false {
            fmt.Printf("--Ip- Opened fd[%v] %s %v\n",fd,dir,name)
            fmt.Printf("--RED1 [%d,%d,%d]->[%d,%d,%d]\n",
                os.Stdin.Fd(),os.Stdout.Fd(),os.Stderr.Fd(),
                pin.Fd(),pout.Fd(),pout.Fd())
        }
            savi := os.Stdin
            savo := os.Stdout
            save := os.Stderr
            os.Stdin  = pin
            os.Stdout = pout
            os.Stderr = pout
        gsh.BackGround = true
        gsh.gshelllh(name)
        gsh.BackGround = false
            os.Stdin  = savi
            os.Stdout = savo
            os.Stderr = save

    gshPA.Files[fdix] = savfd
    return pin,pout,false
```

```
}

// <a name="ex-commands">External commands</a>
func (gsh*GshContext)excommand(exec bool, argv []string) (notf bool,exit bool) {
    if gsh.CmdTrace { fmt.Printf("--I-- excommand[%v](%v)\n",exec,argv) }

    gshPA := gsh.gshPA
    fullpathv, itis := which("PATH",[]string{"which",argv[0],"-s"})
    if itis == false {
        return true,false
    }
    fullpath := fullpathv[0]
    argv = unescapeWhiteSPV(argv)
    if 0 < strings.Index(fullpath,".go") {
        nargv := argv // []string{}
        gofullpathv, itis := which("PATH",[]string{"which","go","-s"})
        if itis == false {
            fmt.Printf("--F-- Go not found\n")
            return false,true
        }
        gofullpath := gofullpathv[0]
        nargv = []string{ gofullpath, "run", fullpath }
        fmt.Printf("--I-- %s {%s %s %s}\n",gofullpath,
            nargv[0],nargv[1],nargv[2])
        if exec {
            syscall.Exec(gofullpath,nargv,os.Environ())
        }else{
            //pid, _ := syscall.ForkExec(gofullpath,nargv,&gshPA)
            proc,_ := os.StartProcess(gofullpath,nargv,&gshPA);
            pstat,_ := proc.Wait();
            pid := pstat.Pid();
            if gsh.BackGround {
                fmt.Fprintf(stderr,"--Ip- in Background pid[%d]%d(%v)\n",pid,len(argv),nargv)
                //gsh.BackGroundJobs = append(gsh.BackGroundJobs,pid)
                gsh.BackGroundJobs = append(gsh.BackGroundJobs,*pstat)
            }else{
                /*
                rusage := aRusage {}
//              syscall.Wait4(pid,nil,0,&rusage)
                gsh.LastRusage = rusage
                gsh.CmdCurrent.Rusagev[1] = rusage
                */

/*
gsh.LastRusage = *pstat.SysUsage().(*aRusage);
gsh.CmdCurrent.Rusagev[1] = *pstat.SysUsage().(*aRusage);
*/
aSetrusage(&gsh.LastRusage,pstat);
gsh.CmdCurrent.Rusagev[1] = gsh.LastRusage;
                }
        }
    }else{
        if exec {
            syscall.Exec(fullpath,argv,os.Environ())
        }else{
            //pid, _ := syscall.ForkExec(fullpath,argv,&gshPA)
            proc,_ := os.StartProcess(fullpath,argv,&gshPA);
            pstat,_ := proc.Wait();
            pid := pstat.Pid();
            //fmt.Printf("[%d]\n",pid); // '&' to be background
if( false ){
fmt.Printf("Sys=%v\n",gshPA.Sys);
if( gshPA.Sys != nil ){
//fmt.Printf("inFG=%v\n",gshPA.Sys.Foreground);
}
}
            if gsh.BackGround {
                fmt.Fprintf(stderr,"--Ip- in Background pid[%d]%d(%v)\n",pid,len(argv),argv)
                //gsh.BackGroundJobs = append(gsh.BackGroundJobs,pid)
                gsh.BackGroundJobs = append(gsh.BackGroundJobs,*pstat)
            }else{
/*
                rusage := aRusage {}
//              syscall.Wait4(pid,nil,0,&rusage);
                gsh.LastRusage = rusage
                gsh.CmdCurrent.Rusagev[1] = rusage
*/
/*
gsh.LastRusage        = *pstat.SysUsage().(*aRusage);
gsh.CmdCurrent.Rusagev[1] = *pstat.SysUsage().(*aRusage);
*/
aSetrusage(&gsh.LastRusage,pstat);
gsh.CmdCurrent.Rusagev[1] = gsh.LastRusage;
                }
        }
    }
    return false,false
}

// <a name="builtin">Builtin Commands</a>
func (gshCtx *GshContext) sleep(argv []string) {
    if len(argv) < 2 {
        fmt.Printf("Sleep 100ms, 100us, 100ns, ...\n")
        return
    }
    duration := argv[1];
    d, err := time.ParseDuration(duration)
    if err != nil {
        d, err = time.ParseDuration(duration+"s")
        if err != nil {
            fmt.Printf("duration ? %s (%s)\n",duration,err)
            return
        }
    }
    //fmt.Printf("Sleep %v\n",duration)
    time.Sleep(d)
    if 0 < len(argv[2:]) {
        gshCtx.gshellv(argv[2:])
    }
}
func (gshCtx *GshContext)repeat(argv []string) {
    if len(argv) < 2 {
        return
    }
    start0 := time.Now()
    for ri,_ := strconv.Atoi(argv[1]); 0 < ri; ri-- {
        if 0 < len(argv[2:]) {
            //start := time.Now()
            gshCtx.gshellv(argv[2:])
            end := time.Now()
            elps := end.Sub(start0);
            if( 1000000000 < elps ){
                fmt.Printf("(repeat#%d %v)\n",ri,elps);
            }
        }
    }
}

func (gshCtx *GshContext)gen(argv []string) {
    gshPA := gshCtx.gshPA
    if len(argv) < 2 {
        fmt.Printf("Usage: %s N\n",argv[0])
        return
    }
    // should br repeated by "repeat" command
    count, _ := strconv.Atoi(argv[1])
    //fd := gshPA.Files[1] // Stdout
    //file := os.NewFile(fd,"internalStdOut")
    file := gshPA.Files[1]; // Stdout
    fmt.Printf("--I-- Gen. Count=%d to [%d]\n",count,file.Fd())
    //buf := []byte{}
    outdata := "0123 5678 0123 5678 0123 5678 0123 5678\r"
    for gi := 0; gi < count; gi++ {
        file.WriteString(outdata)
    }
    //file.WriteString("\n")
    fmt.Printf("\n(%d B)\n",count*len(outdata));
    //file.Close()
}

// <a name="rexec">Remote Execution</a> // 2020-0820
func Elapsed(from time.Time)(string){
    elps := time.Now().Sub(from)
    if 1000000000 < elps {
        return fmt.Sprintf("[%5d.%02ds]",elps/1000000000,(elps%1000000000)/10000000)
    }else
    if 1000000 < elps {
        return fmt.Sprintf("[%3d.%03dms]",elps/1000000,(elps%1000000)/1000)
    }else{
        return fmt.Sprintf("[%3d.%03dus]",elps/1000,(elps%1000))
    }
}
```

```
2268 //func abbtime(nanos int64)(string){
2269 func abbtime(nanos time.Duration)(string){
2270     if 1000000000 < nanos {
2271         return fmt.Sprintf("%d.%02ds",nanos/1000000000,(nanos%1000000000)/10000000)
2272     }else
2273     if 1000000 < nanos {
2274         return fmt.Sprintf("%d.%03dms",nanos/1000000,(nanos%1000000)/1000)
2275     }else{
2276         return fmt.Sprintf("%d.%03dus",nanos/1000,(nanos%1000))
2277     }
2278 }
2279 func abssize(size int64)(string){
2280     fsize := float64(size)
2281     if 1024*1024*1024 < size {
2282         return fmt.Sprintf("%.2fGiB",fsize/(1024*1024*1024))
2283     }else
2284     if 1024*1024 < size {
2285         return fmt.Sprintf("%.3fMiB",fsize/(1024*1024))
2286     }else{
2287         return fmt.Sprintf("%.3fKiB",fsize/1024)
2288     }
2289 }
2290 func absize(size int64)(string){
2291     fsize := float64(size)
2292     if 1024*1024*1024 < size {
2293         return fmt.Sprintf("%8.2fGiB",fsize/(1024*1024*1024))
2294     }else
2295     if 1024*1024 < size {
2296         return fmt.Sprintf("%8.3fMiB",fsize/(1024*1024))
2297     }else{
2298         return fmt.Sprintf("%8.3fKiB",fsize/1024)
2299     }
2300 }
2301 func abbspeed(totalB int64,ns int64)(string){
2302     MBs := (float64(totalB)/1000000) / (float64(ns)/1000000000)
2303     if 1000 <= MBs {
2304         return fmt.Sprintf("%6.3fGB/s",MBs/1000)
2305     }
2306     if 1 <= MBs {
2307         return fmt.Sprintf("%6.3fMB/s",MBs)
2308     }else{
2309         return fmt.Sprintf("%6.3fKB/s",MBs*1000)
2310     }
2311 }
2312 func abspeed(totalB int64,ns time.Duration)(string){
2313     MBs := (float64(totalB)/1000000) / (float64(ns)/1000000000)
2314     if 1000 <= MBs {
2315         return fmt.Sprintf("%6.3fGBps",MBs/1000)
2316     }
2317     if 1 <= MBs {
2318         return fmt.Sprintf("%6.3fMBps",MBs)
2319     }else{
2320         return fmt.Sprintf("%6.3fKBps",MBs*1000)
2321     }
2322 }
2323 func fileRelay(what string,in*os.File,out*os.File,size int64,bsiz int)(wcount int64){
2324     Start := time.Now()
2325     buff := make([]byte,bsiz)
2326     var total int64 = 0
2327     var rem int64 = size
2328     nio := 0
2329     Prev := time.Now()
2330     var PrevSize int64 = 0
2331
2332     fmt.Printf(Elapsed(Start)+"--In- X: %s (%v/%v/%v) START\n",
2333         what,absize(total),size,nio)
2334
2335     for i:= 0; ; i++ {
2336         var len = bsiz
2337         if int(rem) < len {
2338             len = int(rem)
2339         }
2340         Now := time.Now()
2341         Elps := Now.Sub(Prev);
2342         if 1000000000 < Now.Sub(Prev) {
2343             fmt.Printf(Elapsed(Start)+"--In- X: %s (%v/%v/%v) %s\n",
2344                 what,absize(total),size,nio,
2345                 abspeed((total-PrevSize),Elps))
2346             Prev = Now;
2347             PrevSize = total
2348         }
2349         rlen := len
2350         if in != nil {
2351             // should watch the disconnection of out
2352             rcc,err := in.Read(buff[0:rlen])
2353             if err != nil {
2354                 fmt.Printf(Elapsed(Start)+"--En- X: %s read(%v,%v)<%v\n",
2355                     what,rcc,err,in.Name())
2356                 break
2357             }
2358             rlen = rcc
2359             if string(buff[0:10]) == "((SoftEOF " {
2360                 var ecc int64 = 0
2361                 fmt.Sscanf(string(buff),"((SoftEOF %v",&ecc)
2362                 fmt.Printf(Elapsed(Start)+"--En- X: %s Recv ((SoftEOF %v))/%v\n",
2363                     what,ecc,total)
2364                 if ecc == total {
2365                     break
2366                 }
2367             }
2368         }
2369
2370         wlen := rlen
2371         if out != nil {
2372             wcc,err := out.Write(buff[0:rlen])
2373             if err != nil {
2374                 fmt.Printf(Elapsed(Start)+"-En-- X: %s write(%v,%v)>%v\n",
2375                     what,wcc,err,out.Name())
2376                 break
2377             }
2378             wlen = wcc
2379         }
2380         if wlen < rlen {
2381             fmt.Printf(Elapsed(Start)+"--En- X: %s incomplete write (%v/%v)\n",
2382                 what,wlen,rlen)
2383             break;
2384         }
2385
2386         nio += 1
2387         total += int64(rlen)
2388         rem -= int64(rlen)
2389         if rem <= 0 {
2390             break
2391         }
2392     }
2393     Done := time.Now()
2394     Elps := float64(Done.Sub(Start))/1000000000 //Seconds
2395     TotalMB := float64(total)/1000000 //MB
2396     MBps := TotalMB / Elps
2397     fmt.Printf(Elapsed(Start)+"--In- X: %s (%v/%v/%v) %v %.3fMB/s\n",
2398         what,total,size,nio,absize(total),MBps)
2399     return total
2400 }
2401 func tcpPush(clnt *os.File){
2402     // shrink socket buffer and recover
2403     usleep(100);
2404 }
2405 func (gsh*GshContext)RexecServer(argv[]string){
2406     debug := true
2407     Start0 := time.Now()
2408     Start := Start0
2409 //  if local == ":" { local = "0.0.0.0:9999" }
2410     local := "0.0.0.0:9999"
2411
2412     if 0 < len(argv) {
2413         if argv[0] == "-s" {
2414             debug = false
2415             argv = argv[1:]
2416         }
2417     }
2418     if 0 < len(argv) {
2419         argv = argv[1:]
2420     }
2421     port, err := net.ResolveTCPAddr("tcp",local);
2422     if err != nil {
2423         fmt.Printf("--En- S: Address error: %s (%s)\n",local,err)
2424         return
2425     }
2426     fmt.Printf(Elapsed(Start)+"--In- S: Listening at %s...\n",local);
2427     sconn, err := net.ListenTCP("tcp", port)
2428     if err != nil {
2429         fmt.Printf(Elapsed(Start)+"--En- S: Listen error: %s (%s)\n",local,err)
```

```
        return
    }

    reqbuf := make([]byte,LINESIZE)
    res := ""
    for {
        fmt.Printf(Elapsed(Start0)+"--In- S: Listening at %s...\n",local);
        aconn, err := sconn.AcceptTCP()
        Start = time.Now()
        if err != nil {
            fmt.Printf(Elapsed(Start)+"--En- S: Accept error: %s (%s)\n",local,err)
            return
        }
        clnt, _ := aconn.File()
        fd := clnt.Fd()
        ar := aconn.RemoteAddr()
        if debug { fmt.Printf(Elapsed(Start0)+"--In- S: Accepted TCP at %s [%d] <- %v\n",
            local,fd,ar) }
        res = fmt.Sprintf("220 GShell/%s Server\r\n",VERSION)
        fmt.Fprintf(clnt,"%s",res)
        if debug { fmt.Printf(Elapsed(Start)+"--In- S: %s",res) }
        count, err := clnt.Read(reqbuf)
        if err != nil {
            fmt.Printf(Elapsed(Start)+"--En- C: (%v %v) %v",
                count,err,string(reqbuf))
        }
        req := string(reqbuf[:count])
        if debug { fmt.Printf(Elapsed(Start)+"--In- C: %v",string(req)) }
        reqv := strings.Split(string(req),"\r")
        cmdv := gshScanArg(reqv[0],0)
        //cmdv := strings.Split(reqv[0]," ")
        switch cmdv[0] {
            case "HELO":
                res = fmt.Sprintf("250 %v",req)
            case "GET":
                // download {remotefile|-zN} [localfile]
                var dsize int64 = 32*1024*1024
                var bsize int = 64*1024
                var fname string = ""
                var in *os.File = nil
                var pseudoEOF = false
                if 1 < len(cmdv) {
                    fname = cmdv[1]
                    if strBegins(fname,"-z") {
                        fmt.Sscanf(fname[2:],"%d",&dsize)
                    }else
                    if strBegins(fname,"{") {
                        xin,xout,err := gsh.Popen(fname,"r")
                        if err {
                        }else{
                            xout.Close()
                            defer xin.Close()
                            in = xin
                            dsize = MaxStreamSize
                            pseudoEOF = true
                        }
                    }else{
                        xin,err := os.Open(fname)
                        if err != nil {
                            fmt.Printf("--En- GET (%v)\n",err)
                        }else{
                            defer xin.Close()
                            in = xin
                            fi,_ := xin.Stat()
                            dsize = fi.Size()
                        }
                    }
                }
                //fmt.Printf(Elapsed(Start)+"--In- GET %v:%v\n",dsize,bsize)
                res = fmt.Sprintf("200 %v\r\n",dsize)
                fmt.Fprintf(clnt,"%v",res)
                tcpPush(clnt); // should be separated as line in receiver
                fmt.Printf(Elapsed(Start)+"--In- S: %v",res)
                wcount := fileRelay("SendGET",in,clnt,dsize,bsize)
                if pseudoEOF {
                    in.Close() // pipe from the command
                    // show end of stream data (its size) by OOB?
                    SoftEOF := fmt.Sprintf("((SoftEOF %v))",wcount)
                    fmt.Printf(Elapsed(Start)+"--In- S: Send %v\n",SoftEOF)

                    tcpPush(clnt); // to let SoftEOF data apper at the top of recevied data
                    fmt.Fprintf(clnt,"%v\r\n",SoftEOF)
                    tcpPush(clnt); // to let SoftEOF alone in a packet (separate with 200 OK)
                        // with client generated random?
                    //fmt.Printf("--In- L: close %v (%v)\n",in.Fd(),in.Name())
                }
                res = fmt.Sprintf("200 GET done\r\n")
            case "PUT":
                // upload {srcfile|-zN} [dstfile]
                var dsize int64 = 32*1024*1024
                var bsize int = 64*1024
                var fname string = ""
                var out *os.File = nil
                if 1 < len(cmdv) { // localfile
                    fmt.Sscanf(cmdv[1],"%d",&dsize)
                }
                if 2 < len(cmdv) {
                    fname = cmdv[2]
                    if fname == "-" {
                        // nul dev
                    }else
                    if strBegins(fname,"{") {
                        xin,xout,err := gsh.Popen(fname,"w")
                        if err {
                        }else{
                            xin.Close()
                            defer xout.Close()
                            out = xout
                        }
                    }else{
                    // should write to temporary file
                    // should suppress ^C on tty
            xout,err := os.OpenFile(fname,os.O_CREATE|os.O_RDWR|os.O_TRUNC,0600)
            //fmt.Printf("--In- S: open(%v) out(%v) err(%v)\n",fname,xout,err)
                        if err != nil {
                            fmt.Printf("--En- PUT (%v)\n",err)
                        }else{
                            out = xout
                        }
                    }
                fmt.Printf(Elapsed(Start)+"--In- L: open(%v,w) %v (%v)\n",
                    fname,local,err)
                }
                fmt.Printf(Elapsed(Start)+"--In- PUT %v (/%v)\n",dsize,bsize)
                fmt.Printf(Elapsed(Start)+"--In- S: 200 %v OK\r\n",dsize)
                fmt.Fprintf(clnt,"200 %v OK\r\n",dsize)
                fileRelay("RecvPUT",clnt,out,dsize,bsize)
                res = fmt.Sprintf("200 PUT done\r\n")
            default:
                res = fmt.Sprintf("400 What? %v",req)
        }
        swcc,serr := clnt.Write([]byte(res))
        if serr != nil {
            fmt.Printf(Elapsed(Start)+"--In- S: (wc=%v er=%v) %v",swcc,serr,res)
        }else{
            fmt.Printf(Elapsed(Start)+"--In- S: %v",res)
        }
        aconn.Close();
        clnt.Close();
    }
    sconn.Close();
}
func (gsh*GshContext)RexecClient(argv[]string)(int,string){
    debug := true
    Start := time.Now()
    if len(argv) == 1 {
        return -1,"EmptyARG"
    }
    argv = argv[1:]
    if argv[0] == "-serv" {
        gsh.RexecServer(argv[1:])
        return 0,"Server"
    }
    remote := "0.0.0.0:9999"
    if argv[0][0] == '@' {
        remote = argv[0][1:]
        argv = argv[1:]
    }
    if argv[0] == "-s" {
        debug = false
        argv = argv[1:]
    }
```

```
    dport, err := net.ResolveTCPAddr("tcp",remote);
    if err != nil {
        fmt.Printf(Elapsed(Start)+"Address error: %s (%s)\n",remote,err)
        return -1,"AddressError"
    }
    fmt.Printf(Elapsed(Start)+"--In- C: Connecting to %s\n",remote)
    serv, err := net.DialTCP("tcp",nil,dport)
    if err != nil {
        fmt.Printf(Elapsed(Start)+"Connection error: %s (%s)\n",remote,err)
        return -1,"CannotConnect"
    }
    if debug {
        al := serv.LocalAddr()
        fmt.Printf(Elapsed(Start)+"--In- C: Connected to %v <- %v\n",remote,al)
    }

    req := ""
    res := make([]byte,LINESIZE)
    count,err := serv.Read(res)
    if err != nil {
        fmt.Printf("--En- S: (%3d,%v) %v",count,err,string(res))
    }
    if debug { fmt.Printf(Elapsed(Start)+"--In- S: %v",string(res)) }

    if argv[0] == "GET" {
        savPA := gsh.gshPA
        var bsize int = 64*1024
        req = fmt.Sprintf("%v\r\n",strings.Join(argv," "))
        fmt.Printf(Elapsed(Start)+"--In- C: %v",req)
        fmt.Fprintf(serv,req)
        count,err = serv.Read(res)
        if err != nil {
        }else{
            var dsize int64 = 0
            var out *os.File = nil
            var out_tobeclosed *os.File = nil
            var fname string = ""
            var rcode int = 0
            var pid int = -1
            fmt.Sscanf(string(res),"%d %d",&rcode,&dsize)
            fmt.Printf(Elapsed(Start)+"--In- S: %v",string(res[0:count]))
            if 3 <= len(argv) {
                fname = argv[2]
                if strBegins(fname,"{") {
                    xin,xout,err := gsh.Popen(fname,"w")
                    if err {
                    }else{
                        xin.Close()
                        defer xout.Close()
                        out = xout
                        out_tobeclosed = xout
                        pid = 0 // should be its pid
                    }
                }else{
                    // should write to temporary file
                    // should suppress ^C on tty
                    xout,err := os.OpenFile(fname,os.O_CREATE|os.O_RDWR|os.O_TRUNC,0600)
                    if err != nil {
                        fmt.Print("--En- %v\n",err)
                    }
                    out = xout
                    //fmt.Printf("--In-- %d > %s\n",out.Fd(),fname)
                }
            }
            in,_ := serv.File()
            fileRelay("RecvGET",in,out,dsize,bsize)
            if 0 <= pid {
                gsh.gshPA = savPA // recovery of Fd(), and more?
                fmt.Printf(Elapsed(Start)+"--In- L: close Pipe > %v\n",fname)
                out_tobeclosed.Close()
                //syscall.Wait4(pid,nil,0,nil) //@@
            }
        }
    }else
    if argv[0] == "PUT" {
        remote, _ := serv.File()
        var local *os.File = nil
        var dsize int64 = 32*1024*1024
        var bsize int = 64*1024
        var ofile string = "-"
        //fmt.Printf("--I-- Rex %v\n",argv)
        if 1 < len(argv) {
            fname := argv[1]
            if strBegins(fname,"-z") {
                fmt.Sscanf(fname[2:],"%d",&dsize)
            }else
            if strBegins(fname,"{") {
                xin,xout,err := gsh.Popen(fname,"r")
                if err {
                }else{
                    xout.Close()
                    defer xin.Close()
                    //in = xin
                    local = xin
                    fmt.Printf("--In- [%d] < Upload output of %v\n",
                        local.Fd(),fname)
                    ofile = "-from."+fname
                    dsize = MaxStreamSize
                }
            }else{
                xlocal,err := os.Open(fname)
                if err != nil {
                    fmt.Printf("--En- (%s)\n",err)
                    local = nil
                }else{
                    local = xlocal
                    fi,_ := local.Stat()
                    dsize = fi.Size()
                    defer local.Close()
                    //fmt.Printf("--I-- Rex in(%v / %v)\n",ofile,dsize)
                }
                ofile = fname
                fmt.Printf(Elapsed(Start)+"--In- L: open(%v,r)=%v %v (%v)\n",
                    fname,dsize,local,err)
            }
        }
        if 2 < len(argv) && argv[2] != "" {
            ofile = argv[2]
            //fmt.Printf("(%d)%v B.ofile=%v\n",len(argv),argv,ofile)
        }
        //fmt.Printf(Elapsed(Start)+"--I-- Rex out(%v)\n",ofile)
        fmt.Printf(Elapsed(Start)+"--In- PUT %v (/%v)\n",dsize,bsize)
        req = fmt.Sprintf("PUT %v %v \r\n",dsize,ofile)
        if debug { fmt.Printf(Elapsed(Start)+"--In- C: %v",req) }
        fmt.Fprintf(serv,"%v",req)
        count,err = serv.Read(res)
        if debug { fmt.Printf(Elapsed(Start)+"--In- S: %v",string(res[0:count])) }
        fileRelay("SendPUT",local,remote,dsize,bsize)
    }else{
        req = fmt.Sprintf("%v\r\n",strings.Join(argv," "))
        if debug { fmt.Printf(Elapsed(Start)+"--In- C: %v",req) }
        fmt.Fprintf(serv,"%v",req)
        //fmt.Printf("--In- sending RexRequest(%v)\n",len(req))
    }
    //fmt.Printf(Elapsed(Start)+"--In- waiting RexResponse...\n")
    count,err = serv.Read(res)
    ress := ""
    if count == 0 {
        ress = "(nil)\r\n"
    }else{
        ress = string(res[:count])
    }
    if err != nil {
        fmt.Printf(Elapsed(Start)+"--En- S: (%d,%v) %v",count,err,ress)
    }else{
        fmt.Printf(Elapsed(Start)+"--In- S: %v",ress)
    }
    serv.Close()
    //conn.Close()

    var stat string
    var rcode int
    fmt.Sscanf(ress,"%d %s",&rcode,&stat)
    //fmt.Printf("--D-- Client: %v (%v)",rcode,stat)
    return rcode,ress
}

// <a name="remote-sh">Remote Shell</a>
// gcp file [...] { [host]:[port:][dir] | dir } // -p | -no-p
func (gsh*GshContext)FileCopy(argv[]string){
    var host = ""
    var port = ""
```

```
    var upload = false
    var download = false
    var xargv = []string{"rex-gcp"}
    var srcv = []string{}
    var dstv = []string{}
    argv = argv[1:]

    for _,v := range argv {
        /*
        if v[0] == '-' { // might be a pseudo file (generated date)
            continue
        }
        */
        obj := strings.Split(v,":")
        //fmt.Printf("%d %v %v\n",len(obj),v,obj)
        if 1 < len(obj) {
            host = obj[0]
            file = ""
            if 0 < len(host) {
                gsh.LastServer.host = host
            }else{
                host = gsh.LastServer.host
                port = gsh.LastServer.port
            }
            if 2 < len(obj) {
                port = obj[1]
                if 0 < len(port) {
                    gsh.LastServer.port = port
                }else{
                    port = gsh.LastServer.port
                }
                file = obj[2]
            }else{
                file = obj[1]
            }
            if len(srcv) == 0 {
                download = true
                srcv = append(srcv,file)
                continue
            }
            upload = true
            dstv = append(dstv,file)
            continue
        }
        /*
        idx := strings.Index(v,":")
        if 0 <= idx {
            remote = v[0:idx]
            if len(srcv) == 0 {
                download = true
                srcv = append(srcv,v[idx+1:])
                continue
            }
            upload = true
            dstv = append(dstv,v[idx+1:])
            continue
        }
        */
        if download {
            dstv = append(dstv,v)
        }else{
            srcv = append(srcv,v)
        }
    }
    hostport := "@" + host + ":" + port
    if upload {
        if host != "" { xargv = append(xargv,hostport) }
        xargv = append(xargv,"PUT")
        xargv = append(xargv,srcv[0:]...)
        xargv = append(xargv,dstv[0:]...)
    //fmt.Printf("--I-- FileCopy PUT gsh://%s/%v < %v // %v\n",hostport,dstv,srcv,xargv)
    fmt.Printf("--I-- FileCopy PUT gsh://%s/%v < %v\n",hostport,dstv,srcv)
        gsh.RexecClient(xargv)
    }else
    if download {
        if host != "" { xargv = append(xargv,hostport) }
        xargv = append(xargv,"GET")
        xargv = append(xargv,srcv[0:]...)
        xargv = append(xargv,dstv[0:]...)
    //fmt.Printf("--I-- FileCopy GET gsh://%v/%v > %v // %v\n",hostport,srcv,dstv,xargv)
    fmt.Printf("--I-- FileCopy GET gsh://%v/%v > %v\n",hostport,srcv,dstv)
        gsh.RexecClient(xargv)
    }else{
    }
}

// target
func (gsh*GshContext)Trelpath(rloc string)(string){
    cwd, _ := os.Getwd()
    os.Chdir(gsh.RWD)
    os.Chdir(rloc)
    twd, _ := os.Getwd()
    os.Chdir(cwd)

    tpath := twd + "/" + rloc
    return tpath
}
// join to rmote GShell - [user@]host[:port] or cd host:[port]:path
func (gsh*GshContext)Rjoin(argv[]string){
    if len(argv) <= 1 {
        fmt.Printf("--I-- current server = %v\n",gsh.RSERV)
        return
    }
    serv := argv[1]
    servv := strings.Split(serv,":")
    if 1 <= len(servv) {
        if servv[0] == "lo" {
            servv[0] = "localhost"
        }
    }
    switch len(servv) {
        case 1:
            //if strings.Index(serv,":") < 0 {
            serv = servv[0] + ":" + fmt.Sprintf("%d",GSH_PORT)
            //}
        case 2: // host:port
            serv = strings.Join(servv,":")
    }
    xargv := []string{"rex-join","@"+serv,"HELO"}
    rcode,stat := gsh.RexecClient(xargv)
    if (rcode / 100) == 2 {
        fmt.Printf("--I-- OK Joined (%v) %v\n",rcode,stat)
        gsh.RSERV = serv
    }else{
        fmt.Printf("--I-- NG, could not joined (%v) %v\n",rcode,stat)
    }
}
func (gsh*GshContext)Rexec(argv[]string){
    if len(argv) <= 1 {
        fmt.Printf("--I-- rexec command [ | {file || {command} ]\n",gsh.RSERV)
        return
    }

    /*
    nargv := gshScanArg(strings.Join(argv," "),0)
    fmt.Printf("--D-- nargc=%d [%v]\n",len(nargv),nargv)
    if nargv[1][0] != '{' {
        nargv[1] = "{" + nargv[1] + "}"
        fmt.Printf("--D-- nargc=%d [%v]\n",len(nargv),nargv)
    }
    argv = nargv
    */
    nargv := []string{}
    nargv = append(nargv,"{"+strings.Join(argv[1:]," ")+"}")
    fmt.Printf("--D-- nargc=%d %v\n",len(nargv),nargv)
    argv = nargv

    xargv := []string{"rex-exec","@"+gsh.RSERV,"GET"}
    xargv = append(xargv,argv...)
    xargv = append(xargv,"/dev/tty")
    rcode,stat := gsh.RexecClient(xargv)
    if (rcode / 100) == 2 {
        fmt.Printf("--I-- OK Rexec (%v) %v\n",rcode,stat)
    }else{
        fmt.Printf("--I-- NG Rexec (%v) %v\n",rcode,stat)
    }
}
func (gsh*GshContext)Rchdir(argv[]string){
    if len(argv) <= 1 {
        return
    }
    cwd, _ := os.Getwd()
```

```
    os.Chdir(gsh.RWD)
    os.Chdir(argv[1])
    twd, _ := os.Getwd()
    gsh.RWD = twd
    fmt.Printf("--I-- JWD=%v\n",twd)
    os.Chdir(cwd)
}
func (gsh*GshContext)Rpwd(argv[]string){
    fmt.Printf("%v\n",gsh.RWD)
}
func (gsh*GshContext)Rls(argv[]string){
    cwd, _ := os.Getwd()
    os.Chdir(gsh.RWD)
    argv[0] = "-ls"
    gsh.xFind(argv)
    os.Chdir(cwd)
}
func (gsh*GshContext)Rput(argv[]string){
    var local string = ""
    var remote string = ""
    if 1 < len(argv) {
        local = argv[1]
        remote = local // base name
    }
    if 2 < len(argv) {
        remote = argv[2]
    }
    fmt.Printf("--I-- jput from=%v to=%v\n",local,gsh.Trelpath(remote))
}
func (gsh*GshContext)Rget(argv[]string){
    var remote string = ""
    var local string = ""
    if 1 < len(argv) {
        remote = argv[1]
        local = remote // base name
    }
    if 2 < len(argv) {
        local = argv[2]
    }
    fmt.Printf("--I-- jget from=%v to=%v\n",gsh.Trelpath(remote),local)
}

// <a name="network">network</a>
// -s, -si, -so // bi-directional, source, sync (maybe socket)
func (gshCtx*GshContext)sconnect(inTCP bool, argv []string) {
    gshPA := gshCtx.gshPA
    if len(argv) < 2 {
        fmt.Printf("Usage: -s [host]:[port[.udp]]\n")
        return
    }
    remote := argv[1]
    if remote == ":" { remote = "0.0.0.0:9999" }

    if inTCP { // TCP
        dport, err := net.ResolveTCPAddr("tcp",remote);
        if err != nil {
            fmt.Printf("Address error: %s (%s)\n",remote,err)
            return
        }
        conn, err := net.DialTCP("tcp",nil,dport)
        if err != nil {
            fmt.Printf("Connection error: %s (%s)\n",remote,err)
            return
        }
        file, _ := conn.File();
        //fd := file.Fd()
        //fmt.Printf("Socket: connected to %s, socket[%d]\n",remote,fd)
        fmt.Printf("Socket: connected to %s, socket[%d]\n",remote,file.Fd())

        savfd := gshPA.Files[1]
        //gshPA.Files[1] = fd;
        gshPA.Files[1] = file;
        gshCtx.gshellv(argv[2:])
        gshPA.Files[1] = savfd
        file.Close()
        conn.Close()
    }else{
        //dport, err := net.ResolveUDPAddr("udp4",remote);
        dport, err := net.ResolveUDPAddr("udp",remote);
        if err != nil {
            fmt.Printf("Address error: %s (%s)\n",remote,err)
            return
        }
        //conn, err := net.DialUDP("udp4",nil,dport)
        conn, err := net.DialUDP("udp",nil,dport)
        if err != nil {
            fmt.Printf("Connection error: %s (%s)\n",remote,err)
            return
        }
        file, _ := conn.File();
        //fd := file.Fd()

        ar := conn.RemoteAddr()
        //al := conn.LocalAddr()
        fmt.Printf("Socket: connected to %s [%s], socket[%d]\n",
            //remote,ar.String(),fd)
            remote,ar.String(),file.Fd())

        savfd := gshPA.Files[1]
        //gshPA.Files[1] = fd;
        gshPA.Files[1] = file;
        gshCtx.gshellv(argv[2:])
        gshPA.Files[1] = savfd
        file.Close()
        conn.Close()
    }
}
func (gshCtx*GshContext)saccept(inTCP bool, argv []string) {
    gshPA := gshCtx.gshPA
    if len(argv) < 2 {
        fmt.Printf("Usage: -ac [host]:[port[.udp]]\n")
        return
    }
    local := argv[1]
    if local == ":" { local = "0.0.0.0:9999" }
    if inTCP { // TCP
        port, err := net.ResolveTCPAddr("tcp",local);
        if err != nil {
            fmt.Printf("Address error: %s (%s)\n",local,err)
            return
        }
        //fmt.Printf("Listen at %s...\n",local);
        sconn, err := net.ListenTCP("tcp", port)
        if err != nil {
            fmt.Printf("Listen error: %s (%s)\n",local,err)
            return
        }
        //fmt.Printf("Accepting at %s...\n",local);
        aconn, err := sconn.AcceptTCP()
        if err != nil {
            fmt.Printf("Accept error: %s (%s)\n",local,err)
            return
        }
        file, _ := aconn.File()
        //fd := file.Fd()
        //fmt.Printf("Accepted TCP at %s [%d]\n",local,fd)
        fmt.Printf("Accepted TCP at %s [%d]\n",local,file.Fd())

        savfd := gshPA.Files[0]
        //gshPA.Files[0] = fd;
        gshPA.Files[0] = file;
        gshCtx.gshellv(argv[2:])
        gshPA.Files[0] = savfd

        sconn.Close();
        aconn.Close();
        file.Close();
    }else{
        //port, err := net.ResolveUDPAddr("udp4",local);
        port, err := net.ResolveUDPAddr("udp",local);
        if err != nil {
            fmt.Printf("Address error: %s (%s)\n",local,err)
            return
        }
        fmt.Printf("Listen UDP at %s...\n",local);
        //uconn, err := net.ListenUDP("udp4", port)
        uconn, err := net.ListenUDP("udp", port)
        if err != nil {
            fmt.Printf("Listen error: %s (%s)\n",local,err)
            return
        }
        file, _ := uconn.File()
```

```
        //fd := file.Fd()
        ar := uconn.RemoteAddr()
        remote := ""
        if ar != nil { remote = ar.String() }
        if remote == "" { remote = "?" }

        // not yet received
        //fmt.Printf("Accepted at %s [%d] <- %s\n",local,fd,"")

        savfd := gshPA.Files[0]
        //gshPA.Files[0] = fd;
        gshPA.Files[0] = file;
        savenv := gshPA.Env
        gshPA.Env = append(savenv, "REMOTE_HOST="+remote)
        gshCtx.gshellv(argv[2:])
        gshPA.Env = savenv
        gshPA.Files[0] = savfd

        uconn.Close();
        file.Close();
    }
}

// empty line command
func (gshCtx*GshContext)xPwd(argv[]string){
    // execute context command, pwd + date
    // context notation, representation scheme, to be resumed at re-login
    cwd, _ := os.Getwd()
    switch {
    case isin("-a",argv):
        gshCtx.ShowChdirHistory(argv)
    case isin("-ls",argv):
        showFileInfo(cwd,argv)
    default:
        fmt.Printf("%s\n",cwd)
    case isin("-v",argv): // obsolete emtpy command
        t := time.Now()
        date := t.Format(time.UnixDate)
        exe, _ := os.Executable()
        host, _ := os.Hostname()
        fmt.Printf("{PWD=\"%s\"",cwd)
        fmt.Printf(" HOST=\"%s\"",host)
        fmt.Printf(" DATE=\"%s\"",date)
        fmt.Printf(" TIME=\"%s\"",t.String())
        fmt.Printf(" PID=\"%d\"",os.Getpid())
        fmt.Printf(" EXE=\"%s\"",exe)
        fmt.Printf("}\n")
    }
}

// <a name="history">History</a>
// these should be browsed and edited by HTTP browser
// show the time of command with -t and direcotry with -ls
// openfile-history, sort by -a -m -c
// sort by elapsed time by -t -s
// search by "more" like interface
// edit history
// sort history, and wc or uniq
// CPU and other resource consumptions
// limit showing range (by time or so)
// export / import history
func (gshCtx *GshContext)xHistory(argv []string){
    atWorkDirX := -1
    if 1 < len(argv) && strBegins(argv[1],"@") {
        atWorkDirX,_ = strconv.Atoi(argv[1][1:])
    }
    //fmt.Printf("--D-- showHistory(%v)\n",argv)
    for i, v := range gshCtx.CommandHistory {
        // exclude commands not to be listed by default
        // internal commands may be suppressed by default
        if v.CmdLine == "" && !isin("-a",argv) {
            continue;
        }
        if 0 <= atWorkDirX {
            if v.WorkDirX != atWorkDirX {
                continue
            }
        }
        if !isin("-n",argv){ // like "fc"
            fmt.Printf("!%-2d ",i)
        }
        if isin("-v",argv){
            fmt.Println(v) // should be with it date
        }else{
            if isin("-l",argv) || isin("-l0",argv) {
                elps := v.EndAt.Sub(v.StartAt);
                start := v.StartAt.Format(time.Stamp)
                fmt.Printf("@%d ",v.WorkDirX)
                fmt.Printf("[%v] %11v/t ",start,elps)
            }
            if isin("-l",argv) && !isin("-l0",argv){
                fmt.Printf("%v",Rusagef("%t %u\t// %s",argv,v.Rusagev))
            }
            if isin("-at",argv) { // isin("-ls",argv){
                dhi := v.WorkDirX // workdir history index
                fmt.Printf("@%d %s\t",dhi,v.WorkDir)
                // show the FileInfo of the output command??
            }
            fmt.Printf("%s",v.CmdLine)
            fmt.Printf("\n")
        }
    }
}
// !n - history index
func searchHistory(gshCtx GshContext, gline string) (string, bool, bool){
    if gline[0] == '!' {
        hix, err := strconv.Atoi(gline[1:])
        if err != nil {
            fmt.Printf("--E-- (%s : range)\n",hix)
            return "", false, true
        }
        if hix < 0 || len(gshCtx.CommandHistory) <= hix {
            fmt.Printf("--E-- (%d : out of range)\n",hix)
            return "", false, true
        }
        return gshCtx.CommandHistory[hix].CmdLine, false, false
    }
    // search
    //for i, v := range gshCtx.CommandHistory {
    //}
    return gline, false, false
}
func (gsh*GshContext)cmdStringInHistory(hix int)(cmd string, ok bool){
    if 0 <= hix && hix < len(gsh.CommandHistory) {
        return gsh.CommandHistory[hix].CmdLine,true
    }
    return "",false
}

// temporary adding to PATH environment
// cd name -lib for LD_LIBRARY_PATH
// chdir with directory history (date + full-path)
// -s for sort option (by visit date or so)
func (gsh*GshContext)ShowChdirHistory1(i int,v GChdirHistory, argv []string){
    fmt.Printf("!%-2d ",v.CmdIndex) // the first command at this WorkDir
    fmt.Printf("@%d ",i)
    fmt.Printf("[%v] ",v.MovedAt.Format(time.Stamp))
    showFileInfo(v.Dir,argv)
}
func (gsh*GshContext)ShowChdirHistory(argv []string){
    for i, v := range gsh.ChdirHistory {
        gsh.ShowChdirHistory1(i,v,argv)
    }
}
func skipOpts(argv[]string)(int){
    for i,v := range argv {
        if strBegins(v,"-") {
        }else{
            return i
        }
    }
    return -1
}
func (gshCtx*GshContext)xChdir(argv []string){
    cdhist := gshCtx.ChdirHistory
    if isin("?",argv ) || isin("-t",argv) || isin("-a",argv) {
        gshCtx.ShowChdirHistory(argv)
        return
    }
    pwd, _ := os.Getwd()
    dir := ""
    if len(argv) <= 1 {
```

```
        dir = toFullpath("~")
    }else{
        i := skipOpts(argv[1:])
        if i < 0 {
            dir = toFullpath("~")
        }else{
            dir = argv[1+i]
        }
    }
    if strBegins(dir,"@") {
        if dir == "@0" { // obsolete
            dir = gshCtx.StartDir
        }else
        if dir == "@!" {
            index := len(cdhist) - 1
            if 0 < index { index -= 1 }
            dir = cdhist[index].Dir
        }else{
            index, err := strconv.Atoi(dir[1:])
            if err != nil {
                fmt.Printf("--E-- xChdir(%v)\n",err)
                dir = "?"
            }else
            if len(gshCtx.ChdirHistory) <= index {
                fmt.Printf("--E-- xChdir(history range error)\n")
                dir = "?"
            }else{
                dir = cdhist[index].Dir
            }
        }
    }
    if dir != "?" {
        err := os.Chdir(dir)
        if err != nil {
            fmt.Printf("--E-- xChdir(%s)(%v)\n",argv[1],err)
        }else{
            cwd, _ := os.Getwd()
            if cwd != pwd {
                hist1 := GChdirHistory { }
                hist1.Dir = cwd
                hist1.MovedAt = time.Now()
                hist1.CmdIndex = len(gshCtx.CommandHistory)+1
                gshCtx.ChdirHistory = append(cdhist,hist1)
                if !isin("-s",argv){
                    //cwd, _ := os.Getwd()
                    //fmt.Printf("%s\n",cwd)
                    ix := len(gshCtx.ChdirHistory)-1
                    gshCtx.ShowChdirHistory1(ix,hist1,argv)
                }
            }
        }
    }
    if isin("-ls",argv){
        cwd, _ := os.Getwd()
        showFileInfo(cwd,argv);
    }
}
func TimeValSub(tv1 *time.Duration, tv2 *time.Duration){
    //*tv1 = syscall.NsecToTimeval(tv1.Nano() - tv2.Nano())
    *tv1 -= *tv2;
}
func RusageSubv(ru1, ru2 [2]aRusage)([2]aRusage){
    TimeValSub(&ru1[0].Utime,&ru2[0].Utime)
    TimeValSub(&ru1[0].Stime,&ru2[0].Stime)
    TimeValSub(&ru1[1].Utime,&ru2[1].Utime)
    TimeValSub(&ru1[1].Stime,&ru2[1].Stime)
    return ru1
}
func TimeValAdd(tv1 time.Duration, tv2 time.Duration)(time.Duration){
    //tvs := syscall.NsecToTimeval(tv1.Nano() + tv2.Nano())
    tvs := tv1 + tv2;
    return tvs;
}
/*
func RusageAddv(ru1, ru2 [2]aRusage)([2]aRusage){
    TimeValAdd(ru1[0].Utime,ru2[0].Utime)
    TimeValAdd(ru1[0].Stime,ru2[0].Stime)
    TimeValAdd(ru1[1].Utime,ru2[1].Utime)
    TimeValAdd(ru1[1].Stime,ru2[1].Stime)
    return ru1
}
*/

// <a name="rusage">Resource Usage</a>
func sRusagef(fmtspec string, argv []string, ru [2]aRusage)(string){
    // ru[0] self , ru[1] children
    ut := TimeValAdd(ru[0].Utime,ru[1].Utime)
    st := TimeValAdd(ru[0].Stime,ru[1].Stime)
    //uu := (int64(ut.Sec)*1000000 + int64(ut.Usec)) * 1000
    //su := (int64(st.Sec)*1000000 + int64(st.Usec)) * 1000
    uu := ut; // in nano sec
    su := st; // in nano sec
    tu := uu + su
    ret := fmt.Sprintf("%v/sum",abbtime(tu))
    ret += fmt.Sprintf(", %v/usr",abbtime(uu))
    ret += fmt.Sprintf(", %v/sys",abbtime(su))
    return ret
}
func Rusagef(fmtspec string, argv []string, ru [2]aRusage)(string){
    ut := TimeValAdd(ru[0].Utime,ru[1].Utime)
    st := TimeValAdd(ru[0].Stime,ru[1].Stime)
    //fmt.Printf("%d.%06ds/u ",ut.Sec,ut.Usec) //ru[1].Utime.Sec,ru[1].Utime.Usec)
    //fmt.Printf("%d.%06ds/s ",st.Sec,st.Usec) //ru[1].Stime.Sec,ru[1].Stime.Usec)
    fmt.Printf("%d.%06ds/u ",ut/1000000000,(ut/1000)%1000000);
    fmt.Printf("%d.%06ds/s ",st/1000000000,(st/1000)%1000000);
    return ""
}

func Getrusagev()([2]aRusage){
    var ruv = [2]aRusage{}
    aGetrusage(aRUSAGE_SELF,&ruv[0])
    aGetrusage(aRUSAGE_CHILDREN,&ruv[1])
    return ruv
}
func (gshCtx *GshContext)xTime(argv[]string)(bool){
    if 2 <= len(argv){
        gshCtx.LastRusage = aRusage{}
        rusagev1 := Getrusagev()
        fin := gshCtx.gshellv(argv[1:])
        rusagev2 := Getrusagev()
        showRusage(argv[1],argv,&gshCtx.LastRusage)
        rusagev := RusageSubv(rusagev2,rusagev1)
        showRusage("self",argv,&rusagev[0])
        showRusage("chld",argv,&rusagev[1])
        return fin
    }else{
        rusage:= aRusage {}
        aGetrusage(aRUSAGE_SELF,&rusage)
        showRusage("self",argv, &rusage)
        aGetrusage(aRUSAGE_CHILDREN,&rusage)
        showRusage("chld",argv, &rusage)
        return false
    }
}
func (gshCtx *GshContext)xJobs(argv[]string){
    fmt.Printf("%d Jobs\n",len(gshCtx.BackGroundJobs))
    for ji, pid := range gshCtx.BackGroundJobs {
        //wstat := syscall.WaitStatus {0}
        rusage := aRusage {}
        //wpid, err := syscall.Wait4(pid,&wstat,syscall.WNOHANG,&rusage);
        //wpid, err := syscall.Wait4(pid,nil,syscall.WNOHANG,&rusage);

        wpid := pid.Pid();
        err := errors.New("stab_NoError");

        if err != nil {
            fmt.Printf("--E-- %%%d [%d] (%v)\n",ji,wpid,err)
        }else{
            fmt.Printf("%%%d[%d]\n",ji,wpid)
            showRusage("chld",argv,&rusage)
        }
    }
}
func (gsh*GshContext)inBackground(argv[]string)(bool){
    if gsh.CmdTrace { fmt.Printf("--I-- inBackground(%v)\n",argv) }
    gsh.BackGround = true // set background option
    xfin := false
    xfin = gsh.gshellv(argv)
    gsh.BackGround = false
    return xfin
}
// -o file without command means just opening it and refer by #N
```

```
// should be listed by "files" commnand
func (gshCtx*GshContext)xOpen(argv[]string){
    //var pv = []int{-1,-1}
    //err := syscall.Pipe(pv)
    //fmt.Printf("--I-- pipe()=[#%d,#%d](%v)\n",pv[0],pv[1],err)
    pin,pout,err := os.Pipe();
    fmt.Printf("--I-- pipe()=[#%d,#%d](%v)\n",pin.Fd(),pout.Fd(),err)
}
func (gshCtx*GshContext)fromPipe(argv[]string){
}
func (gshCtx*GshContext)xClose(argv[]string){
}

// <a name="redirect">redirect</a>
func (gshCtx*GshContext)redirect(argv[]string)(bool){
    if len(argv) < 2 {
        return false
    }

    cmd := argv[0]
    fname := argv[1]
    var file *os.File = nil

    fdix := 0
    mode := os.O_RDONLY

    switch {
    case cmd == "-i" || cmd == "<":
        fdix = 0
        mode = os.O_RDONLY
    case cmd == "-o" || cmd == ">":
        fdix = 1
        mode = os.O_RDWR | os.O_CREATE
    case cmd == "-a" || cmd == ">>":
        fdix = 1
        mode = os.O_RDWR | os.O_CREATE | os.O_APPEND
    }
    if fname[0] == '#' {
        fd, err := strconv.Atoi(fname[1:])
        if err != nil {
            fmt.Printf("--E-- (%v)\n",err)
            return false
        }
        file = os.NewFile(uintptr(fd),"MaybePipe")
    }else{
        xfile, err := os.OpenFile(argv[1], mode, 0600)
        if err != nil {
            fmt.Printf("--E-- (%s)\n",err)
            return false
        }
        file = xfile
    }
    gshPA := gshCtx.gshPA
    savfd := gshPA.Files[fdix]
    //gshPA.Files[fdix] = file.Fd()
    gshPA.Files[fdix] = file;
    fmt.Printf("--I-- Opened [%d] %s\n",file.Fd(),argv[1])
    gshCtx.gshellv(argv[2:])
    gshPA.Files[fdix] = savfd

    return false
}

//fmt.Fprintf(res, "GShell Status: %q", html.EscapeString(req.URL.Path))
func httpHandler(res http.ResponseWriter, req *http.Request){
    path := req.URL.Path
    fmt.Printf("--I-- Got HTTP Request(%s)\n",path)
    {
        gshCtxBuf, _ :=  setupGshContext()
        gshCtx := &gshCtxBuf
        fmt.Printf("--I-- %s\n",path[1:])
        gshCtx.tgshelll(path[1:])
    }
    fmt.Fprintf(res, "Hello(^-^)//\n%s\n",path)
}
func (gshCtx *GshContext) httpServer(argv []string){
    http.HandleFunc("/", httpHandler)
    accport := "localhost:9999"
    fmt.Printf("--I-- HTTP Server Start at [%s]\n",accport)
    http.ListenAndServe(accport,nil)
}
func (gshCtx *GshContext)xGo(argv[]string){
    go gshCtx.gshellv(argv[1:]);
}
func (gshCtx *GshContext) xPs(argv[]string)(){
}

// <a name="plugin">Plugin</a>
// plugin [-ls [names]] to list plugins
// Reference: <a href="https://golang.org/src/plugin/">plugin</a> source code
func (gshCtx *GshContext) whichPlugin(name string,argv[]string)(pi *PluginInfo){
    pi = nil
    for _,p := range gshCtx.PluginFuncs {
        if p.Name == name && pi == nil {
            pi = &p
        }
        if !isin("-s",argv){
            //fmt.Printf("%v %v ",i,p)
            if isin("-ls",argv){
                showFileInfo(p.Path,argv)
            }else{
                fmt.Printf("%s\n",p.Name)
            }
        }
    }
    return pi
}
func (gshCtx *GshContext) xPlugin(argv[]string) (error) {
    if len(argv) == 0 || argv[0] == "-ls" {
        gshCtx.whichPlugin("",argv)
        return  nil
    }
    name := argv[0]
    Pin := gshCtx.whichPlugin(name,[]string{"-s"})
    if Pin != nil {
        os.Args = argv // should be recovered?
        Pin.Addr.(func())()
        return nil
    }
    sofile := toFullpath(argv[0] + ".so") // or find it by which($PATH)

    p, err := plugin.Open(sofile)
    if err != nil {
        fmt.Printf("--E-- plugin.Open(%s)(%v)\n",sofile,err)
        return err
    }
    fname := "Main"
    f, err := p.Lookup(fname)
    if( err != nil ){
        fmt.Printf("--E-- plugin.Lookup(%s)(%v)\n",fname,err)
        return err
    }
    pin := PluginInfo {p,f,name,sofile}
    gshCtx.PluginFuncs = append(gshCtx.PluginFuncs,pin)
    fmt.Printf("--I-- added (%d)\n",len(gshCtx.PluginFuncs))

    //fmt.Printf("--I-- first call(%s:%s)%v\n",sofile,fname,argv)
    os.Args = argv
    f.(func())()
    return err
}
func (gshCtx*GshContext)Args(argv[]string){
    for i,v := range os.Args {
        fmt.Printf("[%v] %v\n",i,v)
    }
}
func (gshCtx *GshContext) showVersion(argv[]string){
    if isin("-l",argv) {
        fmt.Printf("%v/%v (%v)",NAME,VERSION,DATE);
    }else{
        fmt.Printf("%v",VERSION);
    }
    if isin("-a",argv) {
        fmt.Printf(" %s",AUTHOR)
    }
    if !isin("-n",argv) {
        fmt.Printf("\n")
    }
}

// <a name="scanf">Scanf</a> // string decomposer
// scanf [format] [input]
```

```
3564 func scanv(sstr string)(strv[]string){
3565     strv = strings.Split(sstr," ")
3566     return strv
3567 }
3568 func scanUntil(src,end string)(rstr string,leng int){
3569     idx := strings.Index(src,end)
3570     if 0 <= idx {
3571         rstr = src[0:idx]
3572         return rstr,idx+len(end)
3573     }
3574     return src,0
3575 }
3576
3577 // -bn -- display base-name part only // can be in some %fmt, for sed rewriting
3578 func (gsh*GshContext)printVal(fmts string, vstr string, optv[]string){
3579     //vint,err := strconv.Atoi(vstr)
3580     var ival int64 = 0
3581     n := 0
3582     err := error(nil)
3583     if strBegins(vstr,"_") {
3584         vx,_ := strconv.Atoi(vstr[1:])
3585         if vx < len(gsh.iValues) {
3586             vstr = gsh.iValues[vx]
3587         }else{
3588         }
3589     }
3590     // should use Eval()
3591     if strBegins(vstr,"0x") {
3592         n,err = fmt.Sscanf(vstr[2:],"%x",&ival)
3593     }else{
3594         n,err = fmt.Sscanf(vstr,"%d",&ival)
3595 //fmt.Printf("--D-- n=%d err=(%v) {%s}=%v\n",n,err,vstr, ival)
3596     }
3597     if n == 1 && err == nil {
3598         //fmt.Printf("--D-- formatn(%v) ival(%v)\n",fmts,ival)
3599         fmt.Printf("%"+fmts,ival)
3600     }else{
3601         if isin("-bn",optv){
3602             fmt.Printf("%"+fmts,filepath.Base(vstr))
3603         }else{
3604             fmt.Printf("%"+fmts,vstr)
3605         }
3606     }
3607 }
3608 func (gsh*GshContext)printfv(fmts,div string,argv[]string,optv[]string,list[]string){
3609     //fmt.Printf("{%d}",len(list))
3610     //curfmt := "v"
3611     outlen := 0
3612     curfmt := gsh.iFormat
3613
3614     if 0 < len(fmts) {
3615         for xi := 0; xi < len(fmts); xi++ {
3616             fch := fmts[xi]
3617             if fch == '%' {
3618                 if xi+1 < len(fmts) {
3619                     curfmt = string(fmts[xi+1])
3620 gsh.iFormat = curfmt
3621                     xi += 1
3622     if xi+1 < len(fmts) && fmts[xi+1] == '(' {
3623         vals,leng := scanUntil(fmts[xi+2:],")")
3624         //fmt.Printf("--D-- show fmt(%v) val(%v) next(%v)\n",curfmt,vals,leng)
3625         gsh.printVal(curfmt,vals,optv)
3626         xi += 2+leng-1
3627         outlen += 1
3628     }
3629                     continue
3630                 }
3631             }
3632             if fch == '_' {
3633                 hi,leng := scanInt(fmts[xi+1:])
3634                 if 0 < leng {
3635                     if hi < len(gsh.iValues) {
3636                         gsh.printVal(curfmt,gsh.iValues[hi],optv)
3637                         outlen += 1 // should be the real length
3638                     }else{
3639                         fmt.Printf("((out-range))")
3640                     }
3641                     xi += leng
3642                     continue;
3643                 }
3644             }
3645             fmt.Printf("%c",fch)
3646             outlen += 1
3647         }
3648     }else{
3649         //fmt.Printf("--D-- print {%s}\n")
3650         for i,v := range list {
3651             if 0 < i {
3652                 fmt.Printf(div)
3653             }
3654             gsh.printVal(curfmt,v,optv)
3655             outlen += 1
3656         }
3657     }
3658     if 0 < outlen {
3659         fmt.Printf("\n")
3660     }
3661 }
3662 func (gsh*GshContext)Scanv(argv[]string){
3663     //fmt.Printf("--D-- Scanv(%v)\n",argv)
3664     if len(argv) == 1 {
3665         return
3666     }
3667     argv = argv[1:]
3668     fmts := ""
3669     if strBegins(argv[0],"-F") {
3670         fmts = argv[0]
3671         gsh.iDelimiter = fmts
3672         argv = argv[1:]
3673     }
3674     input := strings.Join(argv," ")
3675     if fmts == "" { // simple decomposition
3676         v := scanv(input)
3677         gsh.iValues = v
3678         //fmt.Printf("%v\n",strings.Join(v,","))
3679     }else{
3680         v := make([]string,8)
3681         n,err := fmt.Sscanf(input,fmts,&v[0],&v[1],&v[2],&v[3])
3682         fmt.Printf("--D-- Scanf ->(%v) n=%d err=(%v)\n",v,n,err)
3683         gsh.iValues = v
3684     }
3685 }
3686 func (gsh*GshContext)Printv(argv[]string){
3687     if false { //@@U
3688         fmt.Printf("%v\n",strings.Join(argv[1:]," "))
3689         return
3690     }
3691     //fmt.Printf("--D-- Printv(%v)\n",argv)
3692     //fmt.Printf("%v\n",strings.Join(gsh.iValues,","))
3693     div := gsh.iDelimiter
3694     fmts := ""
3695     argv = argv[1:]
3696     if 0 < len(argv) {
3697         if strBegins(argv[0],"-F") {
3698             div = argv[0][2:]
3699             argv = argv[1:]
3700         }
3701     }
3702
3703     optv := []string{}
3704     for _,v := range argv {
3705         if strBegins(v,"-"){
3706             optv = append(optv,v)
3707             argv = argv[1:]
3708         }else{
3709             break;
3710         }
3711     }
3712     if 0 < len(argv) {
3713         fmts = strings.Join(argv," ")
3714     }
3715     gsh.printfv(fmts,div,argv,optv,gsh.iValues)
3716 }
3717 func (gsh*GshContext)Basename(argv[]string){
3718     for i,v := range gsh.iValues {
3719         gsh.iValues[i] = filepath.Base(v)
3720     }
3721 }
3722 func (gsh*GshContext)Sortv(argv[]string){
3723     sv := gsh.iValues
3724     sort.Slice(sv , func(i,j int) bool {
3725         return sv[i] < sv[j]
```

```
    })
}
func (gsh*GshContext)Shiftv(argv[]string){
    vi := len(gsh.iValues)
    if 0 < vi {
        if isin("-r",argv) {
            top := gsh.iValues[0]
            gsh.iValues = append(gsh.iValues[1:],top)
        }else{
            gsh.iValues = gsh.iValues[1:]
        }
    }
}

func (gsh*GshContext)Enq(argv[]string){
}
func (gsh*GshContext)Deq(argv[]string){
}
func (gsh*GshContext)Push(argv[]string){
    gsh.iValStack = append(gsh.iValStack,argv[1:])
    fmt.Printf("depth=%d\n",len(gsh.iValStack))
}
func (gsh*GshContext)Dump(argv[]string){
    for i,v := range gsh.iValStack {
        fmt.Printf("%d %v\n",i,v)
    }
}
func (gsh*GshContext)Pop(argv[]string){
    depth := len(gsh.iValStack)
    if 0 < depth {
        v := gsh.iValStack[depth-1]
        if isin("-cat",argv){
            gsh.iValues = append(gsh.iValues,v...)
        }else{
            gsh.iValues = v
        }
        gsh.iValStack = gsh.iValStack[0:depth-1]
        fmt.Printf("depth=%d %s\n",len(gsh.iValStack),gsh.iValues)
    }else{
        fmt.Printf("depth=%d\n",depth)
    }
}

// <a name="interpreter">Command Interpreter</a>
func (gshCtx*GshContext)gshellv(argv []string) (fin bool) {
    fin = false

    if gshCtx.CmdTrace { fmt.Fprintf(os.Stderr,"--I-- gshellv((%d))\n",len(argv)) }
    if len(argv) <= 0 {
        return false
    }
    xargv := []string{}
    for ai := 0; ai < len(argv); ai++ {
        xargv = append(xargv,strsubst(gshCtx,argv[ai],false))
    }
    argv = xargv
    if false {
        for ai := 0; ai < len(argv); ai++ {
            fmt.Printf("[%d] %s [%d]%T\n",
                ai,argv[ai],len(argv[ai]),argv[ai])
        }
    }
    cmd := argv[0]
    if gshCtx.CmdTrace { fmt.Fprintf(os.Stderr,"--I-- gshellv(%d)%v\n",len(argv),argv) }
    switch { // https://tour.golang.org/flowcontrol/11
    case cmd == "":
        gshCtx.xPwd([]string{}); // emtpy command
    case cmd == "-x":
        gshCtx.CmdTrace = ! gshCtx.CmdTrace
    case cmd == "-xt":
        gshCtx.CmdTime = ! gshCtx.CmdTime
    case cmd == "-ot":
        gshCtx.sconnect(true, argv)
    case cmd == "-ou":
        gshCtx.sconnect(false, argv)
    case cmd == "-it":
        gshCtx.saccept(true , argv)
    case cmd == "-iu":
        gshCtx.saccept(false, argv)
    case cmd == "-i" || cmd == "<" || cmd == "-o" || cmd == ">" || cmd == "-a" || cmd == ">>" || cmd == "-s" || cmd == "><":
        gshCtx.redirect(argv)
    case cmd == "|":
        gshCtx.fromPipe(argv)
    case cmd == "args":
        gshCtx.Args(argv)
    case cmd == "bg" || cmd == "-bg":
        rfin := gshCtx.inBackground(argv[1:])
        return rfin
    case cmd == "-bn":
        gshCtx.Basename(argv)
    case cmd == "call":
        _,_ = gshCtx.excommand(false,argv[1:])
    case cmd == "cd" || cmd == "chdir":
        gshCtx.xChdir(argv);
    case cmd == "-cksum":
        gshCtx.xFind(argv)
    case cmd == "-sum":
        gshCtx.xFind(argv)
    case cmd == "-sumtest":
        str := ""
        if 1 < len(argv) { str = argv[1] }
        crc := strCRC32(str,uint64(len(str)))
        fprintf(stderr,"%v %v\n",crc,len(str))
    case cmd == "close":
        gshCtx.xClose(argv)
    case cmd == "gcp":
        gshCtx.FileCopy(argv)
    case cmd == "dec" || cmd == "decode":
        gshCtx.Dec(argv)
    case cmd == "#define":
    case cmd == "dic" || cmd == "d":
        xDic(argv)
    case cmd == "dump":
        gshCtx.Dump(argv)
    case cmd == "echo" || cmd == "e":
        echo(argv,true)
    case cmd == "enc" || cmd == "encode":
        gshCtx.Enc(argv)
    case cmd == "env":
        env(argv)
    case cmd == "eval":
        xEval(argv[1:],true)
    case cmd == "ev" || cmd == "events":
        dumpEvents(argv)
    case cmd == "exec":
        _,_ = gshCtx.excommand(true,argv[1:])
        // should not return here
    case cmd == "exit" || cmd == "quit":
        // write Result code EXIT to 3>
        return true
    case cmd == "fdls":
        // dump the attributes of fds (of other process)
    case cmd == "-find" || cmd == "fin" || cmd == "ufind" || cmd == "uf":
        gshCtx.xFind(argv[1:])
    case cmd == "fu":
        gshCtx.xFind(argv[1:])
    case cmd == "fork":
        // mainly for a server
    case cmd == "-gen":
        gshCtx.gen(argv)
    case cmd == "-go":
        gshCtx.xGo(argv)
    case cmd == "-grep":
        gshCtx.xFind(argv)
    case cmd == "gdeq":
        gshCtx.Deq(argv)
    case cmd == "genq":
        gshCtx.Enq(argv)
    case cmd == "gpop":
        gshCtx.Pop(argv)
    case cmd == "gpush":
        gshCtx.Push(argv)
    case cmd == "history" || cmd == "hi": // hi should be alias
        gshCtx.xHistory(argv)
    case cmd == "jobs":
        gshCtx.xJobs(argv)
    case cmd == "lnsp" || cmd == "nlsp":
        gshCtx.SplitLine(argv)
    case cmd == "-ls":
        gshCtx.xFind(argv)
    case cmd == "nop":
        // do nothing
```

```
    case cmd == "pipe":
        gshCtx.xOpen(argv)
    case cmd == "plug" || cmd == "plugin" || cmd == "pin":
        gshCtx.xPlugin(argv[1:])
    case cmd == "print" || cmd == "-pr":
        // output internal slice // also sprintf should be
        gshCtx.Printv(argv)
    case cmd == "ps":
        gshCtx.xPs(argv)
    case cmd == "pstitle":
        // to be gsh.title
    case cmd == "rexecd" || cmd == "rexd":
        gshCtx.RexecServer(argv)
    case cmd == "rexec" || cmd == "rex":
        gshCtx.RexecClient(argv)
    case cmd == "repeat" || cmd == "rep": // repeat cond command
        gshCtx.repeat(argv)
    case cmd == "replay":
        gshCtx.xReplay(argv)
    case cmd == "scan":
        // scan input (or so in fscanf) to internal slice (like Files or map)
        gshCtx.Scanv(argv)
    case cmd == "set":
        // set name ...
    case cmd == "serv":
        gshCtx.httpServer(argv)
    case cmd == "shift":
        gshCtx.Shiftv(argv)
    case cmd == "sleep":
        gshCtx.sleep(argv)
    case cmd == "-sort":
        gshCtx.Sortv(argv)

    case cmd == "j" || cmd == "join":
        gshCtx.Rjoin(argv)
    case cmd == "a" || cmd == "alpa":
        gshCtx.Rexec(argv)
    case cmd == "jcd" || cmd == "jchdir":
        gshCtx.Rchdir(argv)
    case cmd == "jget":
        gshCtx.Rget(argv)
    case cmd == "jls":
        gshCtx.Rls(argv)
    case cmd == "jput":
        gshCtx.Rput(argv)
    case cmd == "jpwd":
        gshCtx.Rpwd(argv)

    case cmd == "time":
        fin = gshCtx.xTime(argv)
    case cmd == "ungets":
        if 1 < len(argv) {
            ungets(argv[1]+"\n")
        }else{
        }
    case cmd == "pwd":
        gshCtx.xPwd(argv);
    case cmd == "ver" || cmd == "-ver" || cmd == "version":
        gshCtx.showVersion(argv)
    case cmd == "where":
        // data file or so?
    case cmd == "which":
        which("PATH",argv);
    case cmd == "gj" && 1 < len(argv) && argv[1] == "listen":
        go gj_server(argv[1:]);
    case cmd == "gj" && 1 < len(argv) && argv[1] == "serve":
        go gj_server(argv[1:]);
    case cmd == "gj" && 1 < len(argv) && argv[1] == "join":
        go gj_client(argv[1:]);
    case cmd == "gj":
        jsend(argv);
    case cmd == "jsend":
        jsend(argv);
    default:
        if gshCtx.whichPlugin(cmd,[]string{"-s"}) != nil {
            gshCtx.xPlugin(argv)
        }else{
            notfound,_ := gshCtx.excommand(false,argv)
            if notfound {
                fmt.Printf("--E-- command not found (%v)\n",cmd)
            }
        }
    }
    return fin
}

func (gsh*GshContext)gshelll(gline string) (rfin bool) {
    argv := strings.Split(string(gline)," ")
    fin := gsh.gshellv(argv)
    return fin
}
func (gsh*GshContext)tgshelll(gline string)(xfin bool){
    start := time.Now()
    fin := gsh.gshelll(gline)
    end := time.Now()
    elps := end.Sub(start);
    if gsh.CmdTime {
        fmt.Printf("--T-- " + time.Now().Format(time.Stamp) + "(%d.%09ds)\n",
            elps/1000000000,elps%1000000000)
    }
    return fin
}
func Ttyid() (int) {
    fi, err := os.Stdin.Stat()
    if err != nil {
        return 0;
    }
    //fmt.Printf("Stdin: %v Dev=%d\n",
    //  fi.Mode(),fi.Mode()&os.ModeDevice)
    if (fi.Mode() & os.ModeDevice) != 0 {
        stat := aStat_t{};
        err := aFstat(0,&stat)
        if err != nil {
            //fmt.Printf("--I-- Stdin: (%v)\n",err)
        }else{
            //fmt.Printf("--I-- Stdin: rdev=%d %d\n",
            //  stat.Rdev&0xFF,stat.Rdev);
            //fmt.Printf("--I-- Stdin: tty%d\n",stat.Rdev&0xFF);
            return int(stat.Rdev & 0xFF)
        }
    }
    return 0
}
func (gshCtx *GshContext) ttyfile() string {
    //fmt.Printf("--I-- GSH_HOME=%s\n",gshCtx.GshHomeDir)
    ttyfile := gshCtx.GshHomeDir + "/" + "gsh-tty" +
        fmt.Sprintf("%02d",gshCtx.TerminalId)
        //strconv.Itoa(gshCtx.TerminalId)
    //fmt.Printf("--I-- ttyfile=%s\n",ttyfile)
    return ttyfile
}
func (gshCtx *GshContext) ttyline()(*os.File){
    file, err := os.OpenFile(gshCtx.ttyfile(),os.O_RDWR|os.O_CREATE|os.O_TRUNC,0600)
    if err != nil {
        fmt.Printf("--F-- cannot open %s (%s)\n",gshCtx.ttyfile(),err)
        return file;
    }
    return file
}
func (gshCtx *GshContext)getline(hix int, skipping bool, prevline string) (string) {
    if( skipping ){
        reader := bufio.NewReaderSize(os.Stdin,LINESIZE)
        line, _, _ := reader.ReadLine()
        return string(line)
    }else
    if true {
        return xgetline(hix,prevline,gshCtx)
    }
    /*
    else
    if( with_exgetline && gshCtx.GetLine != "" ){
        //var xhix int64 = int64(hix); // cast
        newenv := os.Environ()
        newenv = append(newenv, "GSH_LINENO="+strconv.FormatInt(int64(hix),10) )

        tty := gshCtx.ttyline()
        tty.WriteString(prevline)
        Pa := os.ProcAttr {
            "", // start dir
            newenv, //os.Environ(),
            []*os.File{os.Stdin,os.Stdout,os.Stderr,tty},
            nil,
```

```
        }
//fmt.Printf("--I-- getline=%s // %s\n",gsh_getlinev[0],gshCtx.GetLine)
proc, err := os.StartProcess(gsh_getlinev[0],[]string{"getline","getline"},&Pa)
        if err != nil {
            fmt.Printf("--F-- getline process error (%v)\n",err)
            // for ; ; { }
            return "exit (getline program failed)"
        }
        //stat, err := proc.Wait()
        proc.Wait()
        buff := make([]byte,LINESIZE)
        count, err := tty.Read(buff)
        //_, err = tty.Read(buff)
        //fmt.Printf("--D-- getline (%d)\n",count)
        if err != nil {
            if ! (count == 0) { // && err.String() == "EOF" ) {
                fmt.Printf("--E-- getline error (%s)\n",err)
            }
        }else{
            //fmt.Printf("--I-- getline OK \"%s\"\n",buff)
        }
        tty.Close()
        gline := string(buff[0:count])
        return gline
    }else
    */
    {
        // if isatty {
            fmt.Printf("!%d",hix)
            fmt.Print(PROMPT)
        // }
        reader := bufio.NewReaderSize(os.Stdin,LINESIZE)
        line, _, _ := reader.ReadLine()
        return string(line)
    }
}

//== begin ================================================== getline
/*
 * getline.c
 * 2020-0819 extracted from dog.c
 * getline.go
 * 2020-0822 ported to Go
 */
/*
package main // getline main
import (
    "fmt"       // <a href="https://golang.org/pkg/fmt/">fmt</a>
    "strings"   // <a href="https://golang.org/pkg/strings/">strings</a>
    "os"        // <a href="https://golang.org/pkg/os/">os</a>
    "syscall"   // <a href="https://golang.org/pkg/syscall/">syscall</a>
    //"bytes"     // <a href="https://golang.org/pkg/os/">os</a>
    //"os/exec" // <a href="https://golang.org/pkg/os/">os</a>
)
*/

// C language compatibility functions
var errno = 0
var stdin  *os.File = os.Stdin
var stdout *os.File = os.Stdout
var stderr *os.File = os.Stderr
var EOF = -1
var NULL = 0
type FILE os.File
type StrBuff []byte
var NULL_FP *os.File = nil
var NULLSP = 0
//var LINESIZE = 1024

func system(cmdstr string)(int){
    //PA := syscall.ProcAttr {
    PA := os.ProcAttr {
        "", // the starting directory
        os.Environ(),
        //[]uintptr{os.Stdin.Fd(),os.Stdout.Fd(),os.Stderr.Fd()},
        []*os.File{os.Stdin,os.Stdout,os.Stderr},
        nil,
    }
    argv := strings.Split(cmdstr," ")
    //pid,err := syscall.ForkExec(argv[0],argv,&PA)
    proc,err := os.StartProcess(argv[0],argv,&PA);
    if( err != nil ){
        //fmt.Printf("--Es-- system(%v)\n(%v)\n",cmdstr,err);
        return -1;
    }
    pstat,_ := proc.Wait();
    pid := pstat.Pid();
    if( err != nil ){
        fmt.Printf("--E-- pid=%v syscall(%v) err(%v)\n",pid,cmdstr,err)
    }
    //syscall.Wait4(pid,nil,0,nil)
    //fmt.Printf("====E== pid=%d exit=%v stat=%v\n",pid,pstat.Exited(),pstat.ExitCode());

    /*
    argv := strings.Split(cmdstr," ")
    fmt.Fprintf(os.Stderr,"--I-- system(%v)\n",argv)
    //cmd := exec.Command(argv[0:]...)
    cmd := exec.Command(argv[0],argv[1],argv[2])
    cmd.Stdin = strings.NewReader("output of system")
    var out bytes.Buffer
    cmd.Stdout = &out
    var serr bytes.Buffer
    cmd.Stderr = &serr
    err := cmd.Run()
    if err != nil {
        fmt.Fprintf(os.Stderr,"--E-- system(%v)err(%v)\n",argv,err)
        fmt.Printf("ERR:%s\n",serr.String())
    }else{
        fmt.Printf("%s",out.String())
    }
    */
    return 0
}
func atoi(str string)(ret int){
    ret,err := fmt.Sscanf(str,"%d",ret)
    if err == nil {
        return ret
    }else{
        // should set errno
        return 0
    }
}
func getenv(name string)(string){
    val,got := os.LookupEnv(name)
    if got {
        return val
    }else{
        return "?"
    }
}
func strcpy(dst StrBuff, src string){
    var i int
    srcb := []byte(src)
    for i = 0; i < len(src) && srcb[i] != 0; i++ {
        dst[i] = srcb[i]
    }
    dst[i] = 0
}
func xstrcpy(dst StrBuff, src StrBuff){
    dst = src
}
func strcat(dst StrBuff, src StrBuff){
    dst = append(dst,src...)
}
func strdup(str StrBuff)(string){
    return string(str[0:strlen(str)])
}
func sstrlen(str string)(int){
    return len(str)
}
func strlen(str StrBuff)(int){
    var i int
    for i = 0; i < len(str) && str[i] != 0; i++ {
    }
    return i
}
func sizeof(data StrBuff)(int){
    return len(data)
}
func isatty(fd int)(ret int){
    return 1
}
```

```
4212
4213 func fopen(file string,mode string)(fp*os.File){
4214     if mode == "r" {
4215         fp,err := os.Open(file)
4216         if( err != nil ){
4217             fmt.Printf("--E-- fopen(%s,%s)=(%v)\n",file,mode,err)
4218             return NULL_FP;
4219         }
4220         return fp;
4221     }else{
4222         fp,err := os.OpenFile(file,os.O_RDWR|os.O_CREATE|os.O_TRUNC,0600)
4223         if( err != nil ){
4224             return NULL_FP;
4225         }
4226         return fp;
4227     }
4228 }
4229 func fclose(fp*os.File){
4230     fp.Close()
4231 }
4232 func fflush(fp *os.File)(int){
4233     return 0
4234 }
4235 func fgetc(fp*os.File)(int){
4236     var buf [1]byte
4237     _,err := fp.Read(buf[0:1])
4238     if( err != nil ){
4239         return EOF;
4240     }else{
4241         return int(buf[0])
4242     }
4243 }
4244 func sfgets(str*string, size int, fp*os.File)(int){
4245     buf := make(StrBuff,size)
4246     var ch int
4247     var i int
4248     for i = 0; i < len(buf)-1; i++ {
4249         ch = fgetc(fp)
4250         //fprintf(stderr,"--fgets %d/%d %X\n",i,len(buf),ch)
4251         if( ch == EOF ){
4252             break;
4253         }
4254         buf[i] = byte(ch);
4255         if( ch == '\n' ){
4256             break;
4257         }
4258     }
4259     buf[i] = 0
4260     //fprintf(stderr,"--fgets %d/%d (%s)\n",i,len(buf),buf[0:i])
4261     return i
4262 }
4263 func fgets(buf StrBuff, size int, fp*os.File)(int){
4264     var ch int
4265     var i int
4266     for i = 0; i < len(buf)-1; i++ {
4267         ch = fgetc(fp)
4268         //fprintf(stderr,"--fgets %d/%d %X\n",i,len(buf),ch)
4269         if( ch == EOF ){
4270             break;
4271         }
4272         buf[i] = byte(ch);
4273         if( ch == '\n' ){
4274             break;
4275         }
4276     }
4277     buf[i] = 0
4278     //fprintf(stderr,"--fgets %d/%d (%s)\n",i,len(buf),buf[0:i])
4279     return i
4280 }
4281 func fputc(ch int , fp*os.File)(int){
4282     var buf [1]byte
4283     buf[0] = byte(ch)
4284     fp.Write(buf[0:1])
4285     return 0
4286 }
4287 func fputs(buf StrBuff, fp*os.File)(int){
4288     fp.Write(buf)
4289     return 0
4290 }
4291 func xfputss(str string, fp*os.File)(int){
4292     return fputs([]byte(str),fp)
4293 }
4294 func sscanf(str StrBuff,fmts string, params ...interface{})(int){
4295     fmt.Sscanf(string(str[0:strlen(str)]),fmts,params...)
4296     return 0
4297 }
4298 func fprintf(fp*os.File,fmts string, params ...interface{})(int){
4299     fmt.Fprintf(fp,fmts,params...)
4300     return 0
4301 }
4302
4303 // <a name="IME">Command Line IME</a>
4304 //---------------------------------------------------------------------- MyIME
4305 var MyIMEVER = "MyIME/0.0.2";
4306 type RomKana struct {
4307     dic string  // dictionaly ID
4308     pat string  // input pattern
4309     out string  // output pattern
4310     hit int64   // count of hit and used
4311 }
4312 var dicents = 0
4313 var romkana [1024]RomKana
4314 var Romkan []RomKana
4315
4316 func isinDic(str string)(int){
4317     for i,v := range Romkan {
4318         if v.pat == str {
4319             return i
4320         }
4321     }
4322     return -1
4323 }
4324 const (
4325     DIC_COM_LOAD = "im"
4326     DIC_COM_DUMP = "a"
4327     DIC_COM_LIST = "ls"
4328     DIC_COM_ENA  = "en"
4329     DIC_COM_DIS  = "di"
4330 )
4331 func helpDic(argv []string){
4332     out := stderr
4333     cmd := ""
4334     if 0 < len(argv) { cmd = argv[0] }
4335     fprintf(out,"--- %v Usage\n",cmd)
4336     fprintf(out,"... Commands\n")
4337     fprintf(out,"...   %v %-3v [dicName] [dicURL ] -- Import dictionary\n",cmd,DIC_COM_LOAD)
4338     fprintf(out,"...   %v %-3v [pattern] -- Search in dictionary\n",cmd,DIC_COM_DUMP)
4339     fprintf(out,"...   %v %-3v [dicName] -- List dictionaries\n",cmd,DIC_COM_LIST)
4340     fprintf(out,"...   %v %-3v [dicName] -- Disable dictionaries\n",cmd,DIC_COM_DIS)
4341     fprintf(out,"...   %v %-3v [dicName] -- Enable dictionaries\n",cmd,DIC_COM_ENA)
4342     fprintf(out,"... Keys ... %v\n","ESC can be used for '\\'")
4343     fprintf(out,"...   \\c -- Reverse the case of the last character\n",)
4344     fprintf(out,"...   \\i -- Replace input with translated text\n",)
4345     fprintf(out,"...   \\j -- On/Off translation mode\n",)
4346     fprintf(out,"...   \\l -- Force Lower Case\n",)
4347     fprintf(out,"...   \\u -- Force Upper Case (software CapsLock)\n",)
4348     fprintf(out,"...   \\v -- Show translation actions\n",)
4349     fprintf(out,"...   \\x -- Replace the last input character with it Hexa-Decimal\n",)
4350 }
4351 func xDic(argv[]string){
4352     if len(argv) <= 1 {
4353         helpDic(argv)
4354         return
4355     }
4356     argv = argv[1:]
4357     var debug = false
4358     var info = false
4359     var silent = false
4360     var dump = false
4361     var builtin = false
4362     cmd := argv[0]
4363     argv = argv[1:]
4364     opt := ""
4365     arg := ""
4366
4367     if 0 < len(argv) {
4368         arg1 := argv[0]
4369         if arg1[0] == '-' {
4370             switch arg1 {
4371                 default: fmt.Printf("--Ed-- Unknown option(%v)\n",arg1)
4372                     return
4373                 case "-b": builtin = true
```

```
                case "-d": debug = true
                case "-s": silent = true
                case "-v": info = true
            }
            opt = arg1
            argv = argv[1:]
        }
    }

    dicName := ""
    dicURL := ""
    if 0 < len(argv) {
        arg = argv[0]
        dicName = arg
        argv = argv[1:]
    }
    if 0 < len(argv) {
        dicURL = argv[0]
        argv = argv[1:]
    }
    if false {
        fprintf(stderr,"--Dd-- com(%v) opt(%v) arg(%v)\n",cmd,opt,arg)
    }
    if cmd == DIC_COM_LOAD {
        //dicType := ""
        dicBody := ""
        if !builtin && dicName != "" && dicURL == "" {
            f,err := os.Open(dicName)
            if err == nil {
                dicURL = dicName
            }else{
                f,err = os.Open(dicName+".html")
                if err == nil {
                    dicURL = dicName+".html"
                }else{
                    f,err = os.Open("gshdic-"+dicName+".html")
                    if err == nil {
                        dicURL = "gshdic-"+dicName+".html"
                    }
                }
            }
            if err == nil {
                var buf = make([]byte,128*1024)
                count,err := f.Read(buf)
                f.Close()
                if info {
                    fprintf(stderr,"--Id-- ReadDic(%v,%v)\n",count,err)
                }
                dicBody = string(buf[0:count])
            }
        }
        if dicBody == "" {
            switch arg {
                default:
                    dicName = "WorldDic"
                    dicURL = WorldDic
                    if info {
                    fprintf(stderr,"--Id-- default dictionary \"%v\"\n",
                        dicName);
                    }
                case "wnn":
                    dicName = "WnnDic"
                    dicURL = WnnDic
                case "sumomo":
                    dicName = "SumomoDic"
                    dicURL = SumomoDic
                case "sijimi":
                    dicName = "SijimiDic"
                    dicURL = SijimiDic
                case "jkl":
                    dicName = "JKLJaDic"
                    dicURL = JA_JKLDic
            }
            if debug {
                fprintf(stderr,"--Id-- %v URL=%v\n\n",dicName,dicURL);
            }
            dicv := strings.Split(dicURL,",")
            if debug {
                fprintf(stderr,"--Id-- %v encoded data...\n",dicName)
                fprintf(stderr,"Type: %v\n",dicv[0])
                fprintf(stderr,"Body: %v\n",dicv[1])
                fprintf(stderr,"\n")
            }
            body,_ := base64.StdEncoding.DecodeString(dicv[1])
            dicBody = string(body)
        }
        if info {
            fmt.Printf("--Id-- %v %v\n",dicName,dicURL)
            fmt.Printf("%s\n",dicBody)
        }
        if debug {
            fprintf(stderr,"--Id-- dicName %v text...\n",dicName)
            fprintf(stderr,"%v\n",string(dicBody))
        }
        entv := strings.Split(dicBody,"\n");
        if info {
            fprintf(stderr,"--Id-- %v scan...\n",dicName);
        }
        var added int = 0
        var dup int = 0
        for i,v := range entv {
            var pat string
            var out string
            fmt.Sscanf(v,"%s %s",&pat,&out)
            if len(pat) <= 0 {
            }else{
                if 0 <= isinDic(pat) {
                    dup += 1
                    continue
                }
                romkana[dicents] = RomKana{dicName,pat,out,0}
                dicents += 1
                added += 1
                Romkan = append(Romkan,RomKana{dicName,pat,out,0})
                if debug {
                    fmt.Printf("[%3v]:[%2v]%-8v [%2v]%v\n",
                        i,len(pat),pat,len(out),out)
                }
            }
        }
        if !silent {
            url := dicURL
            if strBegins(url,"data:") {
                url = "builtin"
            }
            fprintf(stderr,"--Id-- %v scan... %v added, %v dup. / %v total (%v)\n",
                dicName,added,dup,len(Romkan),url);
        }
        // should sort by pattern length for conclete match, for performance
        if debug {
            arg = "" // search pattern
            dump = true
        }
    }
    if cmd == DIC_COM_DUMP || dump {
        fprintf(stderr,"--Id-- %v dump... %v entries:\n",dicName,len(Romkan));
        var match = 0
        for i := 0; i < len(Romkan); i++ {
            dic := Romkan[i].dic
            pat := Romkan[i].pat
            out := Romkan[i].out
            if arg == "" || 0 <= strings.Index(pat,arg)||0 <= strings.Index(out,arg) {
                fmt.Printf("\\\\%v\t%v [%2v]%-8v [%2v]%v\n",
                    i,dic,len(pat),pat,len(out),out)
                match += 1
            }
        }
        fprintf(stderr,"--Id-- %v matched %v / %v entries:\n",arg,match,len(Romkan));
    }
}
func loadDefaultDic(dic int){
    if( 0 < len(Romkan) ){
        return
    }
    //fprintf(stderr,"\r\n")
    xDic([]string{"dic",DIC_COM_LOAD});

    var info = false
    if info {
        fprintf(stderr,"--Id-- Conguraturations!! WorldDic is now activated.\r\n")
        fprintf(stderr,"--Id-- enter \"dic\" command for help.\r\n")
    }
```

```
}
func readDic()(int){
    /*
    var rk *os.File;
    var dic = "MyIME-dic.txt";
    //rk = fopen("romkana.txt","r");
    //rk = fopen("JK-JA-morse-dic.txt","r");
    rk = fopen(dic,"r");
    if( rk == NULL_FP ){
        if( true ){
            fprintf(stderr,"--%s-- Could not load %s\n",MyIMEVER,dic);
        }
        return -1;
    }
    if( true ){
        var di int;
        var line = make(StrBuff,1024);
        var pat string
        var out string
        for di = 0; di < 1024; di++ {
            if( fgets(line,sizeof(line),rk) == NULLSP ){
                break;
            }
            fmt.Sscanf(string(line[0:strlen(line)]),"%s %s",&pat,&out);
            //sscanf(line,"%s %[^\r\n]",&pat,&out);
            romkana[di].pat = pat;
            romkana[di].out = out;
            //fprintf(stderr,"--Dd- %-10s %s\n",pat,out)
        }
        dicents += di
        if( false ){
            fprintf(stderr,"--%s-- loaded romkana.txt [%d]\n",MyIMEVER,di);
            for di = 0; di < dicents; di++ {
                fprintf(stderr,
                    "%s %s\n",romkana[di].pat,romkana[di].out);
            }
        }
    }
    fclose(rk);

    //romkana[dicents].pat = "//ddump"
    //romkana[dicents].pat = "//ddump" // dump the dic. and clean the command input
    */
    return 0;
}
func matchlen(stri string, pati string)(int){
    if strBegins(stri,pati) {
        return len(pati)
    }else{
        return 0
    }
}
func convs(src string)(string){
    var si int;
    var sx = len(src);
    var di int;
    var mi int;
    var dstb []byte

    for si = 0; si < sx; { // search max. match from the position
        if strBegins(src[si:],"%x/") {
            // %x/integer/ // s/a/b/
            ix := strings.Index(src[si+3:],"/")
            if 0 < ix {
                var iv int = 0
                //fmt.Sscanf(src[si+3:si+3+ix],"%d",&iv)
                fmt.Sscanf(src[si+3:si+3+ix],"%v",&iv)
                sval := fmt.Sprintf("%x",iv)
                bval := []byte(sval)
                dstb = append(dstb,bval...)
                si = si+3+ix+1
                continue
            }
        }
        if strBegins(src[si:],"%d/") {
            // %d/integer/ // s/a/b/
            ix := strings.Index(src[si+3:],"/")
            if 0 < ix {
                var iv int = 0
                fmt.Sscanf(src[si+3:si+3+ix],"%v",&iv)
                sval := fmt.Sprintf("%d",iv)
                bval := []byte(sval)
                dstb = append(dstb,bval...)
                si = si+3+ix+1
                continue
            }
        }
        if strBegins(src[si:],"%t") {
            now := time.Now()
            if true {
                date := now.Format(time.Stamp)
                dstb = append(dstb,[]byte(date)...)
                si = si+3
            }
            continue
        }
        var maxlen int = 0;
        var len int;
        mi = -1;
        for di = 0; di < dicents; di++ {
            len = matchlen(src[si:],romkana[di].pat);
            if( maxlen < len ){
                maxlen = len;
                mi = di;
            }
        }
        if( 0 < maxlen ){
            out := romkana[mi].out;
            dstb = append(dstb,[]byte(out)...);
            si += maxlen;
        }else{
            dstb = append(dstb,src[si])
            si += 1;
        }
    }
    return string(dstb)
}
func trans(src string)(int){
    dst := convs(src);
    xfputss(dst,stderr);
    return 0;
}

//---------------------------------------------------------------- LINEEDIT
// "?" at the top of the line means searching history

// should be compatilbe with Telnet
const (
    EV_MODE     = 255
    EV_IDLE     = 254
    EV_TIMEOUT  = 253

    GO_UP       = 252   // k
    GO_DOWN     = 251   // j
    GO_RIGHT    = 250   // l
    GO_LEFT     = 249   // h
    DEL_RIGHT   = 248   // x
    GO_TOPL     = 'A'-0x40  // 0
    GO_ENDL     = 'E'-0x40  // $

    GO_TOPW     = 239   // b
    GO_ENDW     = 238   // e
    GO_NEXTW    = 237   // w

    GO_FORWCH   = 229   // f
    GO_PAIRCH   = 228   // %

    GO_DEL      = 219   // d

    HI_SRCH_FW  = 209   // /
    HI_SRCH_BK  = 208   // ?
    HI_SRCH_RFW = 207   // n
    HI_SRCH_RBK = 206   // N
)

// should return number of octets ready to be read immediately
//fprintf(stderr,"\n--Select(%v %v)\n",err,r.Bits[0])


var EventRecvFd = -1 // file descriptor
var EventSendFd = -1
const EventFdOffset = 1000000
```

```
const NormalFdOffset = 100

/* 2020-1021 replaced poll() with channel/select
func putKeyinEvent(event int, evarg int){
    if true {
        if EventRecvFd < 0 {
            var pv = []int{-1,-1}
//          syscall.Pipe(pv)
            EventRecvFd = pv[0]
            EventSendFd = pv[1]
            //fmt.Printf("--De-- EventPipe created[%v,%v]\n",EventRecvFd,EventSendFd)
        }
    }else{
        if EventRecvFd < 0 {
            // the document differs from this spec
            // https://golang.org/src/syscall/syscall_unix.go?s=8096:8158#L340
            sv,err := syscall.Socketpair(syscall.AF_UNIX,syscall.SOCK_STREAM,0)
            EventRecvFd = sv[0]
            EventSendFd = sv[1]
            if err != nil {
                fmt.Printf("--De-- EventSock created[%v,%v](%v)\n",
                    EventRecvFd,EventSendFd,err)
            }
        }
    }
    var buf = []byte{ byte(event)}
    n,err := syscall.Write(EventSendFd,buf)
    if err != nil {
        fmt.Printf("--De-- putEvent[%v](%3v)(%v %v)\n",EventSendFd,event,n,err)
    }
}
*/
func ungets(str string){
    for _,ch := range str {
        putKeyinEvent(int(ch),0)
    }
}
func (gsh*GshContext)xReplay(argv[]string){
    hix := 0
    tempo := 1.0
    xtempo := 1.0
    repeat := 1

    for _,a := range argv { // tempo
        if strBegins(a,"x") {
            fmt.Sscanf(a[1:],"%f",&xtempo)
            tempo = 1 / xtempo
            //fprintf(stderr,"--Dr-- tempo=[%v]%v\n",a[2:],tempo);
        }else
        if strBegins(a,"r") { // repeat
            fmt.Sscanf(a[1:],"%v",&repeat)
        }else
        if strBegins(a,"!") {
            fmt.Sscanf(a[1:],"%d",&hix)
        }else{
            fmt.Sscanf(a,"%d",&hix)
        }
    }
    if hix == 0 || len(argv) <= 1 {
        hix = len(gsh.CommandHistory)-1
    }
    fmt.Printf("--Ir-- Replay(!%v x%v r%v)\n",hix,xtempo,repeat)
        //dumpEvents(hix)
    //gsh.xScanReplay(hix,false,repeat,tempo,argv)
    go gsh.xScanReplay(hix,true,repeat,tempo,argv)

    runtime.Gosched(); // wait xScanReplay is launched
    //fmt.Printf("--Ir-- Replay set\n");
}

// <a href="https://golang.org/pkg/syscall/#FdSet">syscall.Select</a>
// 2020-0827 GShell-0.2.3
/*
func FpollIn1(fp *os.File,usec int)(uintptr){
    nfd := 1

    rdv := syscall.FdSet {}
    fd1 := fp.Fd()
    bank1 := fd1/32
    mask1 := int32(1 << fd1)
    rdv.Bits[bank1] = mask1

    fd2 := -1
    bank2 := -1
    var mask2 int32 = 0

    if 0 <= EventRecvFd {
        fd2 = EventRecvFd
        nfd = fd2 + 1
        bank2 = fd2/32
        mask2 = int32(1 << fd2)
        rdv.Bits[bank2] |= mask2
        //fmt.Printf("--De-- EventPoll mask added [%d][%v][%v]\n",fd2,bank2,mask2)
    }

    tout := syscall.NsecToTimeval(int64(usec*1000))
    //n,err := syscall.Select(nfd,&rdv,nil,nil,&tout) // spec. mismatch
    err := syscall.Select(nfd,&rdv,nil,nil,&tout)
    if err != nil {
        //fmt.Printf("--De-- select() err(%v)\n",err)
    }
    if err == nil {
        if 0 <= fd2 && (rdv.Bits[bank2] & mask2) != 0 {
            if false {
                fmt.Printf("--De-- got Event\n")
            }
            return uintptr(EventFdOffset + fd2)
        }else
        if (rdv.Bits[bank1] & mask1) != 0 {
            return uintptr(NormalFdOffset + fd1)
        }else{
            return 1
        }
    }else{
        return 0
    }
}
*/
/*
func fgetcTimeout1(fp *os.File,usec int)(int){
 READ1:
    //readyFd := FpollIn1(fp,usec)
    readyFd := CFpollIn1(fp,usec)
    if readyFd < 100 {
        return EV_TIMEOUT
    }

    var buf [1]byte

    if EventFdOffset <= readyFd {
        fd := int(readyFd-EventFdOffset)
        _,err := syscall.Read(fd,buf[0:1])
        if( err != nil ){
            return EOF;
        }else{
            if buf[0] == EV_MODE {
                recvKeyEvent(fd)
                goto READ1
            }
            return int(buf[0])
        }
    }

    _,err := fp.Read(buf[0:1])
    if( err != nil ){
        return EOF;
    }else{
        return int(buf[0])
    }
}
*/

func visibleChar(ch int)(string){
    switch {
        case '!' <= ch && ch <= '~':
            return string(ch)
    }
    switch ch {
        case ' ': return "\\s"
        case '\n': return "\\n"
        case '\r': return "\\r"
        case '\t': return "\\t"
```

```
    }
    switch ch {
        case 0x00: return "NUL"
        case 0x07: return "BEL"
        case 0x08: return "BS"
        case 0x0E: return "SO"
        case 0x0F: return "SI"
        case 0x1B: return "ESC"
        case 0x7F: return "DEL"
    }
    switch ch {
        case EV_IDLE: return fmt.Sprintf("IDLE")
        case EV_MODE: return fmt.Sprintf("MODE")
    }
    return fmt.Sprintf("%X",ch)
}
/*
func recvKeyEvent(fd int){
    var buf = make([]byte,1)
    _,_ = syscall.Read(fd,buf[0:1])
    if( buf[0] != 0 ){
        romkanmode = true
    }else{
        romkanmode = false
    }
}
*/
func (gsh*GshContext)xScanReplay(hix int,replay bool,repeat int,tempo float64,argv[]string){
    var Start time.Time
    var events = []Event{}
    for _,e := range Events {
        if hix == 0 || e.CmdIndex == hix {
            events = append(events,e)
        }
    }
    elen := len(events)
    if 0 < elen {
        if events[elen-1].event == EV_IDLE {
            events = events[0:elen-1]
        }
    }
    for r := 0; r < repeat; r++ {
        for i,e := range events {
            nano := e.when.Nanosecond()
            micro := nano / 1000
            if Start.Second() == 0 {
                Start = time.Now()
            }
            diff := time.Now().Sub(Start)
            if replay {
                if e.event != EV_IDLE {
                    //fmt.Printf("--replay %v / %v event=%X\n",i,len(events),e.event);
                    putKeyinEvent(e.event,0)
                    if e.event == EV_MODE { // event with arg
                        putKeyinEvent(int(e.evarg),0)
                    }
                }else{
                    //fmt.Printf("--replay %v / %v idle=%X\n",i,len(events),e.event);
                }
            }else{
            fmt.Printf("%7.3fms #%-3v !%-3v [%v.%06d] %3v %02X %-4v %10.3fms\n",
                    float64(diff)/1000000.0,
                    i,
                    e.CmdIndex,
                    e.when.Format(time.Stamp),micro,
                    e.event,e.event,visibleChar(e.event),
                    float64(e.evarg)/1000000.0)
            }
            if e.event == EV_IDLE {
                //fmt.Printf("--replay %v / %v delay\n",i,len(events));
                d := time.Duration(float64(time.Duration(e.evarg)) * tempo)
                //nsleep(time.Duration(e.evarg))
                nsleep(d)
            }
        }
    }
}
func dumpEvents(arg[]string){
    hix := 0
    if 1 < len(arg) {
        fmt.Sscanf(arg[1],"%d",&hix)
    }
    for i,e := range Events {
        nano := e.when.Nanosecond()
        micro := nano / 1000
        //if e.event != EV_TIMEOUT {
        if hix == 0 || e.CmdIndex == hix {
            fmt.Printf("#%-3v !%-3v [%v.%06d] %3v %02X %-4v %10.3fms\n",i,
                e.CmdIndex,
                e.when.Format(time.Stamp),micro,
                e.event,e.event,visibleChar(e.event),float64(e.evarg)/1000000.0)
        }
        //}
    }
}
/*
func fgetcTimeout(fp *os.File,usec int)(int){
    ch := fgetcTimeout1(fp,usec)
    if ch != EV_TIMEOUT {
        now := time.Now()
        if 0 < len(Events) {
            last := Events[len(Events)-1]
            dura := int64(now.Sub(last.when))
            Events = append(Events,Event{last.when,EV_IDLE,dura,last.CmdIndex})
        }
        Events = append(Events,Event{time.Now(),ch,0,CmdIndex})
    }
    return ch
}
*/

// 2020-1021 replaced poll() with channel/select
var Kbd = make(chan int);
var Kbinit = false;
var evQ = make(chan int);
/*
func keyInput(kbd chan int, fp *os.File){
    for {
        ch := C.getc(C.stdin);
        if( ch == C.EOF ){
            break;
        }
        kbd <- int(ch);
    }
}
*/
// https://godoc.org/golang.org/x/crypto/ssh/terminal
// https://stackoverflow.com/questions/14094190/function-similar-to-getchar
func keyInput(kbd chan int, tty *os.File){
    tmode := C.setTermRaw();
    defer func(){ C.setTermMode(tmode); }();
    if( !OnWindows ){
        system("/bin/stty -echo -icanon");
        defer func(){ system("/bin/stty echo sane"); }();
    }
    for {
        var rbuf []byte = make([]byte,1);
        if( OnWindows ){
            C.setTermRaw();
        }
        _,rerr := tty.Read(rbuf);
        if( rerr != nil ){
            break;
        }
        //fmt.Printf("++KBD[%X]\n",rbuf[0]);
        kbd <- int(rbuf[0]);
    }
    if( !OnWindows ){ system("/bin/stty echo sane"); }
}
func fgetcTimeout(fp *os.File,usec int)(int){
    if( !Kbinit ){
        Kbinit = true;
        go keyInput(Kbd,fp);
    }
    for {
        select {
            case <- time.After(time.Duration(usec*1000)):
                //fmt.Printf("--Timeout %v us\n",usec);
                return EV_TIMEOUT;
            case ch := <- Kbd:
                //fmt.Printf("--KBD[%X]\n",ch);
                // record a Keyin(ch) Event
```

```
                {
                    now := time.Now()
                    if 0 < len(Events) {
                        last := Events[len(Events)-1]
                        dura := int64(now.Sub(last.when))
                        Events = append(Events,Event{last.when,EV_IDLE,dura,last.CmdIndex})
                    }
                    Events = append(Events,Event{time.Now(),ch,0,CmdIndex})
                }
                return ch;
            case ch := <- evQ:
                if( ch == EV_MODE ){
                    recvKeyEvent()
                }else{
                    return ch;
                }
        }
    }
}
func putKeyinEvent(event int, evarg int){
    evQ <- event;
}
func recvKeyEvent(){
    ch := <- evQ;
    if( ch != 0 ){
        romkanmode = true
    }else{
        romkanmode = false
    }
}

var AtConsoleLineTop = true
var TtyMaxCol = 72 // to be obtained by ioctl?
var EscTimeout = (100*1000)
var (
    MODE_VicMode    bool    // vi compatible command mode
    MODE_ShowMode   bool
    romkanmode  bool    // shown translation mode, the mode to be retained
    MODE_Recursive  bool    // recursive translation
    MODE_CapsLock   bool    // software CapsLock
    MODE_LowerLock  bool    // force lower-case character lock
    MODE_ViInsert   int // visible insert mode, should be like "I" icon in X Window
    MODE_ViTrace    bool    // output newline before translation
)
type IInput struct {
    lno     int
    lastlno     int
    pch     []int   // input queue
    prompt      string
    line        string
    right       string
    inJmode     bool
    pinJmode    bool
    waitingMeta string  // waiting meta character
    LastCmd     string
}
func (iin*IInput)Getc(timeoutUs int)(int){
    ch1 := EOF
    ch2 := EOF
    ch3 := EOF
    if( 0 < len(iin.pch) ){ // deQ
        ch1 = iin.pch[0]
        iin.pch = iin.pch[1:]
    }else{
        ch1 = fgetcTimeout(stdin,timeoutUs);
    }
    if( ch1 == 033 ){ /// escape sequence
        ch2 = fgetcTimeout(stdin,EscTimeout);
        if( ch2 == EV_TIMEOUT ){
        }else{
            ch3 = fgetcTimeout(stdin,EscTimeout);
            if( ch3 == EV_TIMEOUT ){
                iin.pch = append(iin.pch,ch2) // enQ
            }else{
                switch( ch2 ){
                    default:
                        iin.pch = append(iin.pch,ch2) // enQ
                        iin.pch = append(iin.pch,ch3) // enQ
                    case '[':
                        switch( ch3 ){
                            case 'A': ch1 = GO_UP; // ^
                            case 'B': ch1 = GO_DOWN; // v
                            case 'C': ch1 = GO_RIGHT; // >
                            case 'D': ch1 = GO_LEFT; // <
                            case '3':
                        ch4 := fgetcTimeout(stdin,EscTimeout);
                                if( ch4 == '~' ){
                        //fprintf(stderr,"x[%02X %02X %02X %02X]\n",ch1,ch2,ch3,ch4);
                                    ch1 = DEL_RIGHT
                                }
                        }
                    case '\\':
                    //ch4 := fgetcTimeout(stdin,EscTimeout);
                    //fprintf(stderr,"y[%02X %02X %02X %02X]\n",ch1,ch2,ch3,ch4);
                        switch( ch3 ){
                            case '~': ch1 = DEL_RIGHT
                        }
                }
            }
        }
    }
    return ch1
}
func (inn*IInput)clearline(){
    var i int
    fprintf(stderr,"\r");
    // should be ANSI ESC sequence
    for i = 0; i < TtyMaxCol; i++ { // to the max. position in this input action
        fputc(' ',os.Stderr);
    }
    fprintf(stderr,"\r");
}
func (iin*IInput)Redraw(){
    redraw(iin,iin.lno,iin.line,iin.right)
}
func redraw(iin *IInput,lno int,line string,right string){
    inMeta := false
    showMode := ""
    showMeta := "" // visible Meta mode on the cursor position
    showLino := fmt.Sprintf("!%d! ",lno)
    InsertMark := "" // in visible insert mode

    if MODE_VicMode {
    }else
    if 0 < len(iin.right) {
        InsertMark = " "
    }

    if( 0 < len(iin.waitingMeta) ){
        inMeta = true
        if iin.waitingMeta[0] != 033 {
            showMeta = iin.waitingMeta
        }
    }
    if( romkanmode ){
        //romkanmark = " *";
    }else{
        //romkanmark = "";
    }
    if MODE_ShowMode {
        romkan := "--"
        inmeta := "-"
        inveri := ""
        if MODE_CapsLock {
            inmeta = "A"
        }
        if MODE_LowerLock {
            inmeta = "a"
        }
        if MODE_ViTrace {
            inveri = "v"
        }
        if MODE_VicMode {
            inveri = ":"
        }
        if romkanmode {
            romkan = "\343\201\202"
            if MODE_CapsLock {
                inmeta = "R"
            }else{
                inmeta = "r"
            }
```

```
        }
        if inMeta {
            inmeta = "\\"
        }
        showMode = "["+romkan+inmeta+inveri+"]";
    }
    Pre := "\r" + showMode + showLino
    Output := ""
    Left := ""
    Right := ""
    if romkanmode {
        Left = convs(line)
        Right = InsertMark+convs(right)
    }else{
        Left = line
        Right = InsertMark+right
    }
    Output = Pre+Left
    if MODE_ViTrace {
        Output += iin.LastCmd
    }
    Output += showMeta+Right
    for len(Output) < TtyMaxCol { // to the max. position that may be dirty
        Output += " "
        // should be ANSI ESC sequence
        // not necessary just after newline
    }
    Output += Pre+Left+showMeta // to set the cursor to the current input position
    fprintf(stderr,"%s",Output)

    if MODE_ViTrace {
        if 0 < len(iin.LastCmd) {
            iin.LastCmd = ""
            fprintf(stderr,"\r\n")
        }
    }
    AtConsoleLineTop  = false
    //fmt.Printf("(Redraw(%v)(%v))\n",len(line),len(right));
}
// <a href="https://golang.org/pkg/unicode/utf8/">utf8</a>
func delHeadChar(str string)(rline string,head string){
    _,clen := utf8.DecodeRune([]byte(str))
    head = string(str[0:clen])
    return str[clen:],head
}
func delTailChar(str string)(rline string, last string){
    var i = 0
    var clen = 0
    for {
        _,siz := utf8.DecodeRune([]byte(str)[i:])
        if siz <= 0 { break }
        clen = siz
        i += siz
    }
    last = str[len(str)-clen:]
    return str[0:len(str)-clen],last
}

// 3> for output and history
// 4> for keylog?
// <a name="getline">Command Line Editor</a>
func xgetline(lno int, prevline string, gsh*GshContext)(string){
    var iin IInput
    iin.lastlno = lno
    iin.lno = lno

    CmdIndex = len(gsh.CommandHistory)
    if( isatty(0) == 0 ){
        if( sfgets(&iin.line,LINESIZE,stdin) == NULL ){
            iin.line = "exit\n";
        }else{
        }
        return iin.line
    }
    if( true ){
        //var pts string;
        //pts = ptsname(0);
        //pts = ttyname(0);
        //fprintf(stderr,"--pts[0] = %s\n",pts?pts:"?");
    }
    if( false ){
        fprintf(stderr,"! ");
        fflush(stderr);
        sfgets(&iin.line,LINESIZE,stdin);
        return iin.line
    }
    if( !OnWindows ){ system("/bin/stty -echo -icanon"); }
    xline := iin.xgetline1(prevline,gsh)
    if( !OnWindows ){system("/bin/stty echo sane"); }
    return xline
}
func (iin*IInput)Translate(cmdch int){
    romkanmode = !romkanmode;
    if MODE_ViTrace {
        fprintf(stderr,"%v\r\n",string(cmdch));
    }else
    if( cmdch == 'J' ){
        fprintf(stderr,"J\r\n");
        iin.inJmode = true
    }
    iin.Redraw();
    loadDefaultDic(cmdch);
    iin.Redraw();
}
func (iin*IInput)Replace(cmdch int){
    iin.LastCmd = fmt.Sprintf("\\%v",string(cmdch))
    iin.Redraw();
    loadDefaultDic(cmdch);
    dst := convs(iin.line+iin.right);
    iin.line = dst
    iin.right = ""
    if( cmdch == 'I' ){
        fprintf(stderr,"I\r\n");
        iin.inJmode = true
    }
    iin.Redraw();
}
// aa 12 ala1
func isAlpha(ch rune)(bool){
    if 'a' <= ch && ch <= 'z' || 'A' <= ch && ch <= 'Z' {
        return true
    }
    return false
}
func isAlnum(ch rune)(bool){
    if 'a' <= ch && ch <= 'z' || 'A' <= ch && ch <= 'Z' {
        return true
    }
    if '0' <= ch && ch <= '9' {
        return true
    }
    return false
}

// 0.2.8 2020-0901 created
// <a href="https://golang.org/pkg/unicode/utf8/#DecodeRuneInString">DecodeRuneInString</a>
func (iin*IInput)GotoTOPW(){
    str := iin.line
    i := len(str)
    if i <= 0 {
        return
    }
    //i0 := i
    i -= 1
    lastSize := 0
    var lastRune rune
    var found = -1
    for 0 < i { // skip preamble spaces
        lastRune,lastSize = utf8.DecodeRuneInString(str[i:])
        if !isAlnum(lastRune) { // character, type, or string to be searched
            i -= lastSize
            continue
        }
        break
    }
    for 0 < i {
        lastRune,lastSize = utf8.DecodeRuneInString(str[i:])
        if lastSize <= 0 { continue } // not the character top
        if !isAlnum(lastRune) { // character, type, or string to be searched
            found = i
            break
        }
```

```
        i -= lastSize
    }
    if found < 0 && i == 0 {
        found = 0
    }
    if 0 <= found {
        if isAlnum(lastRune) { // or non-kana character
        }else{ // when positioning to the top o the word
            i += lastSize
        }
        iin.right = str[i:] + iin.right
        if 0 < i {
            iin.line = str[0:i]
        }else{
            iin.line = ""
        }
    }
    //fmt.Printf("\n(%d,%d,%d)[%s][%s]\n",i0,i,found,iin.line,iin.right)
    //fmt.Printf("") // set debug messae at the end of line
}
// 0.2.8 2020-0901 created
func (iin*IInput)GotoENDW(){
    str := iin.right
    if len(str) <= 0 {
        return
    }
    lastSize := 0
    var lastRune rune
    var lastW = 0
    i := 0
    inWord := false

    lastRune,lastSize = utf8.DecodeRuneInString(str[0:])
    if isAlnum(lastRune) {
        r,z := utf8.DecodeRuneInString(str[lastSize:])
        if 0 < z && isAlnum(r) {
            inWord = true
        }
    }
    for i < len(str) {
        lastRune,lastSize = utf8.DecodeRuneInString(str[i:])
        if lastSize <= 0 { break } // broken data?
        if !isAlnum(lastRune) { // character, type, or string to be searched
            break
        }
        lastW = i // the last alnum if in alnum word
        i += lastSize
    }
    if inWord {
        goto DISP
    }
    for i < len(str) {
        lastRune,lastSize = utf8.DecodeRuneInString(str[i:])
        if lastSize <= 0 { break } // broken data?
        if isAlnum(lastRune) { // character, type, or string to be searched
            break
        }
        i += lastSize
    }
    for i < len(str) {
        lastRune,lastSize = utf8.DecodeRuneInString(str[i:])
        if lastSize <= 0 { break } // broken data?
        if !isAlnum(lastRune) { // character, type, or string to be searched
            break
        }
        lastW = i
        i += lastSize
    }
DISP:
    if 0 < lastW {
        iin.line = iin.line + str[0:lastW]
        iin.right = str[lastW:]
    }
    //fmt.Printf("\n(%d)[%s][%s]\n",i,iin.line,iin.right)
    //fmt.Printf("") // set debug messae at the end of line
}
// 0.2.8 2020-0901 created
func (iin*IInput)GotoNEXTW(){
    str := iin.right
    if len(str) <= 0 {
        return
    }
    lastSize := 0
    var lastRune rune
    var found = -1
    i := 1
    for i < len(str) {
        lastRune,lastSize = utf8.DecodeRuneInString(str[i:])
        if lastSize <= 0 { break } // broken data?
        if !isAlnum(lastRune) { // character, type, or string to be searched
            found = i
            break
        }
        i += lastSize
    }
    if 0 < found {
        if isAlnum(lastRune) { // or non-kana character
        }else{ // when positioning to the top o the word
            found += lastSize
        }
        iin.line = iin.line + str[0:found]
        if 0 < found {
            iin.right = str[found:]
        }else{
            iin.right = ""
        }
    }
    //fmt.Printf("\n(%d)[%s][%s]\n",i,iin.line,iin.right)
    //fmt.Printf("") // set debug messae at the end of line
}
// 0.2.8 2020-0902 created
func (iin*IInput)GotoPAIRCH(){
    str := iin.right
    if len(str) <= 0 {
        return
    }
    lastRune,lastSize := utf8.DecodeRuneInString(str[0:])
    if lastSize <= 0 {
        return
    }
    forw := false
    back := false
    pair := ""
    switch string(lastRune){
        case "{": pair = "}"; forw = true
        case "}": pair = "{"; back = true
        case "(": pair = ")"; forw = true
        case ")": pair = "("; back = true
        case "[": pair = "]"; forw = true
        case "]": pair = "["; back = true
        case "<": pair = ">"; forw = true
        case ">": pair = "<"; back = true
        case "\"": pair = "\""; // context depednet, can be f" or back-double quote
        case "'": pair = "'"; // context depednet, can be f' or back-quote
        // case Japanese Kakkos
    }
    if forw {
        iin.SearchForward(pair)
    }
    if back {
        iin.SearchBackward(pair)
    }
}
// 0.2.8 2020-0902 created
func (iin*IInput)SearchForward(pat string)(bool){
    right := iin.right
    found := -1
    i := 0
    if strBegins(right,pat) {
        _,z := utf8.DecodeRuneInString(right[i:])
        if 0 < z {
            i += z
        }
    }
    for i < len(right) {
        if strBegins(right[i:],pat) {
            found = i
            break
        }
        _,z := utf8.DecodeRuneInString(right[i:])
        if z <= 0 { break }
        i += z
```

```
    }
    if 0 <= found {
        iin.line = iin.line + right[0:found]
        iin.right = iin.right[found:]
        return true
    }else{
        return false
    }
}
// 0.2.8 2020-0902 created
func (iin*IInput)SearchBackward(pat string)(bool){
    line := iin.line
    found := -1
    i := len(line)-1
    for i = i; 0 <= i; i-- {
        _,z := utf8.DecodeRuneInString(line[i:])
        if z <= 0 {
            continue
        }
        //fprintf(stderr,"-- %v %v\n",pat,line[i:])
        if strBegins(line[i:],pat) {
            found = i
            break
        }
    }
    //fprintf(stderr,"--%d\n",found)
    if 0 <= found {
        iin.right = line[found:] + iin.right
        iin.line = line[0:found]
        return true
    }else{
        return false
    }
}
// 0.2.8 2020-0902 created
// search from top, end, or current position
func (gsh*GshContext)SearchHistory(pat string, forw bool)(bool,string){
    if forw {
        for _,v := range gsh.CommandHistory {
            if 0 <= strings.Index(v.CmdLine,pat) {
                //fprintf(stderr,"\n--De-- found !%v [%v]%v\n",i,pat,v.CmdLine)
                return true,v.CmdLine
            }
        }
    }else{
        hlen := len(gsh.CommandHistory)
        for i := hlen-1; 0 < i ; i-- {
            v := gsh.CommandHistory[i]
            if 0 <= strings.Index(v.CmdLine,pat) {
                //fprintf(stderr,"\n--De-- found !%v [%v]%v\n",i,pat,v.CmdLine)
                return true,v.CmdLine
            }
        }
    }
    //fprintf(stderr,"\n--De-- not-found(%v)\n",pat)
    return false,"(Not Found in History)"
}
// 0.2.8 2020-0902 created
func (iin*IInput)GotoFORWSTR(pat string,gsh*GshContext){
    found := false
    if 0 < len(iin.right) {
        found = iin.SearchForward(pat)
    }
    if !found {
        found,line := gsh.SearchHistory(pat,true)
        if found {
            iin.line = line
            iin.right = ""
        }
    }
}
func (iin*IInput)GotoBACKSTR(pat string, gsh*GshContext){
    found := false
    if 0 < len(iin.line) {
        found = iin.SearchBackward(pat)
    }
    if !found {
        found,line := gsh.SearchHistory(pat,false)
        if found {
            iin.line = line
            iin.right = ""
        }
    }
}
func (iin*IInput)getstring1(prompt string)(string){ // should be editable
    iin.clearline();
    fprintf(stderr,"\r%v",prompt)
    str := ""
    for {
        ch := iin.Getc(10*1000*1000)
        if ch == '\n' || ch == '\r' {
            break
        }
        sch := string(ch)
        str += sch
        fprintf(stderr,"%s",sch)
    }
    return str
}

// search pattern must be an array and selectable with ^N/^P
var SearchPat = ""
var SearchForw = true

func (iin*IInput)xgetline1(prevline string, gsh*GshContext)(string){
    var ch int;

    MODE_ShowMode = false
    MODE_VicMode = false
    iin.Redraw();
    first := true

    for cix := 0; ; cix++ {
        iin.pinJmode = iin.inJmode
        iin.inJmode = false

        ch = iin.Getc(1000*1000)

        if ch != EV_TIMEOUT && first {
            first = false
            mode := 0
            if romkanmode {
                mode = 1
            }
            now := time.Now()
            Events = append(Events,Event{now,EV_MODE,int64(mode),CmdIndex})
        }
        if ch == 033 {
            MODE_ShowMode = true
            MODE_VicMode = !MODE_VicMode
            iin.Redraw();
            continue
        }
        if MODE_VicMode {
            switch ch {
                case '0': ch = GO_TOPL
                case '$': ch = GO_ENDL
                case 'b': ch = GO_TOPW
                case 'e': ch = GO_ENDW
                case 'w': ch = GO_NEXTW
                case '%': ch = GO_PAIRCH

                case 'j': ch = GO_DOWN
                case 'k': ch = GO_UP
                case 'h': ch = GO_LEFT
                case 'l': ch = GO_RIGHT
                case 'x': ch = DEL_RIGHT
                case 'a': MODE_VicMode = !MODE_VicMode
                    ch = GO_RIGHT
                case 'i': MODE_VicMode = !MODE_VicMode
                    iin.Redraw();
                    continue
                case '~':
                    right,head := delHeadChar(iin.right)
                    if len([]byte(head)) == 1 {
                        ch = int(head[0])
                        if( 'a' <= ch && ch <= 'z' ){
                            ch = ch + 'A'-'a'
                        }else
                        if( 'A' <= ch && ch <= 'Z' ){
                            ch = ch + 'a'-'A'
                        }
```

```
                    iin.right = string(ch) + right
                }
                iin.Redraw();
                continue
            case 'f': // GO_FORWCH
                iin.Redraw();
                ch = iin.Getc(3*1000*1000)
                if ch == EV_TIMEOUT {
                    iin.Redraw();
                    continue
                }
                SearchPat = string(ch)
                SearchForw = true
                iin.GotoFORWSTR(SearchPat,gsh)
                iin.Redraw();
                continue
            case '/':
                SearchPat = iin.getstring1("/") // should be editable
                SearchForw = true
                iin.GotoFORWSTR(SearchPat,gsh)
                iin.Redraw();
                continue
            case '?':
                SearchPat = iin.getstring1("?") // should be editable
                SearchForw = false
                iin.GotoBACKSTR(SearchPat,gsh)
                iin.Redraw();
                continue
            case 'n':
                if SearchForw {
                    iin.GotoFORWSTR(SearchPat,gsh)
                }else{
                    iin.GotoBACKSTR(SearchPat,gsh)
                }
                iin.Redraw();
                continue
            case 'N':
                if !SearchForw {
                    iin.GotoFORWSTR(SearchPat,gsh)
                }else{
                    iin.GotoBACKSTR(SearchPat,gsh)
                }
                iin.Redraw();
                continue
        }
    }
    switch ch {
        case GO_TOPW:
            iin.GotoTOPW()
            iin.Redraw();
            continue
        case GO_ENDW:
            iin.GotoENDW()
            iin.Redraw();
            continue
        case GO_NEXTW:
            // to next space then
            iin.GotoNEXTW()
            iin.Redraw();
            continue
        case GO_PAIRCH:
            iin.GotoPAIRCH()
            iin.Redraw();
            continue
    }

    //fprintf(stderr,"A[%02X]\n",ch);
    if( ch == '\\' || ch == 033 ){
        MODE_ShowMode = true
        metach := ch
        iin.waitingMeta = string(ch)
        iin.Redraw();
            // set cursor //fprintf(stderr,"???\b\b\b")
        ch = fgetcTimeout(stdin,2000*1000)
            // reset cursor
        iin.waitingMeta = ""

        cmdch := ch
        if( ch == EV_TIMEOUT ){
            if metach == 033 {
                continue
            }
            ch = metach
        }else
        /*
        if( ch == 'm' || ch == 'M' ){
            mch := fgetcTimeout(stdin,1000*1000)
            if mch == 'r' {
                romkanmode = true
            }else{
                romkanmode = false
            }
            continue
        }else
        */
        if( ch == 'k' || ch == 'K' ){
            MODE_Recursive = !MODE_Recursive
            iin.Translate(cmdch);
            continue
        }else
        if( ch == 'j' || ch == 'J' ){
            iin.Translate(cmdch);
            continue
        }else
        if( ch == 'i' || ch == 'I' ){
            iin.Replace(cmdch);
            continue
        }else
        if( ch == 'l' || ch == 'L' ){
            MODE_LowerLock = !MODE_LowerLock
            MODE_CapsLock = false
            if MODE_ViTrace {
                fprintf(stderr,"%v\r\n",string(cmdch));
            }
            iin.Redraw();
            continue
        }else
        if( ch == 'u' || ch == 'U' ){
            MODE_CapsLock = !MODE_CapsLock
            MODE_LowerLock = false
            if MODE_ViTrace {
                fprintf(stderr,"%v\r\n",string(cmdch));
            }
            iin.Redraw();
            continue
        }else
        if( ch == 'v' || ch == 'V' ){
            MODE_ViTrace = !MODE_ViTrace
            if MODE_ViTrace {
                fprintf(stderr,"%v\r\n",string(cmdch));
            }
            iin.Redraw();
            continue
        }else
        if( ch == 'c' || ch == 'C' ){
            if 0 < len(iin.line) {
                xline,tail := delTailChar(iin.line)
                if len([]byte(tail)) == 1 {
                    ch = int(tail[0])
                    if( 'a' <= ch && ch <= 'z' ){
                        ch = ch + 'A'-'a'
                    }else
                    if( 'A' <= ch && ch <= 'Z' ){
                        ch = ch + 'a'-'A'
                    }
                    iin.line = xline + string(ch)
                }
            }
            if MODE_ViTrace {
                fprintf(stderr,"%v\r\n",string(cmdch));
            }
            iin.Redraw();
            continue
        }else{
            iin.pch = append(iin.pch,ch) // push
            ch = '\\'
        }
    }
    switch( ch ){
        case 'P'-0x40: ch = GO_UP
        case 'N'-0x40: ch = GO_DOWN
        case 'B'-0x40: ch = GO_LEFT
```

```
            case 'F'-0x40: ch = GO_RIGHT
        }
        //fprintf(stderr,"B[%02X]\n",ch);
        switch( ch ){
            case 0:
                continue;

            case '\t':
                iin.Replace('j');
                continue
            case 'X'-0x40:
                iin.Replace('j');
                continue

            case EV_TIMEOUT:
                iin.Redraw();
                if iin.pinJmode {
                    fprintf(stderr,"\\J\r\n")
                    iin.inJmode = true
                }
                continue
            case GO_UP:
                if iin.lno == 1 {
                    continue
                }
                cmd,ok := gsh.cmdStringInHistory(iin.lno-1)
                if ok {
                    iin.line = cmd
                    iin.right = ""
                    iin.lno = iin.lno - 1
                }
                iin.Redraw();
                continue
            case GO_DOWN:
                cmd,ok := gsh.cmdStringInHistory(iin.lno+1)
                if ok {
                    iin.line = cmd
                    iin.right = ""
                    iin.lno = iin.lno + 1
                }else{
                    iin.line = ""
                    iin.right = ""
                    if iin.lno == iin.lastlno-1 {
                        iin.lno = iin.lno + 1
                    }
                }
                iin.Redraw();
                continue
            case GO_LEFT:
                if 0 < len(iin.line) {
                    xline,tail := delTailChar(iin.line)
                    iin.line = xline
                    iin.right = tail + iin.right
                }
                iin.Redraw();
                continue;
            case GO_RIGHT:
                if( 0 < len(iin.right) && iin.right[0] != 0 ){
                    xright,head := delHeadChar(iin.right)
                    iin.right = xright
                    iin.line += head
                }
                iin.Redraw();
                continue;
            case EOF:
                goto EXIT;
            case 'R'-0x40: // replace
                dst := convs(iin.line+iin.right);
                iin.line = dst
                iin.right = ""
                iin.Redraw();
                continue;
            case 'T'-0x40: // just show the result
                readDic();
                romkanmode = !romkanmode;
                iin.Redraw();
                continue;
            case 'L'-0x40:
                iin.Redraw();
                continue
            case 'K'-0x40:
                iin.right = ""
                iin.Redraw();
                continue
            case 'E'-0x40:
                iin.line += iin.right
                iin.right = ""
                iin.Redraw();
                continue
            case 'A'-0x40:
                iin.right = iin.line + iin.right
                iin.line = ""
                iin.Redraw();
                continue
            case 'U'-0x40:
                iin.line = ""
                iin.right = ""
                iin.clearline();
                iin.Redraw();
                continue;
            case DEL_RIGHT:
                if( 0 < len(iin.right) ){
                    iin.right,_ = delHeadChar(iin.right)
                    iin.Redraw();
                }
                continue;
            case 0x7F: // BS? not DEL
                if( 0 < len(iin.line) ){
                    iin.line,_ = delTailChar(iin.line)
                    iin.Redraw();
                }
                /*
                else
                if( 0 < len(iin.right) ){
                    iin.right,_ = delHeadChar(iin.right)
                    iin.Redraw();
                }
                */
                continue;
            case 'H'-0x40:
                if( 0 < len(iin.line) ){
                    iin.line,_ = delTailChar(iin.line)
                    iin.Redraw();
                }
                continue;
        }
        if( OnWindows && ch == '\n' ){
            continue;
        }
        if( ch == '\n' || ch == '\r' ){
            iin.line += iin.right;
            iin.right = ""
            iin.Redraw();
            //fputc(ch,stderr);
            fprintf(stderr,"\r\n"); // NL on Unix, CR on Windows
            AtConsoleLineTop  = true
            break;
        }
        if MODE_CapsLock {
            if 'a' <= ch && ch <= 'z' {
                ch = ch+'A'-'a'
            }
        }
        if MODE_LowerLock {
            if 'A' <= ch && ch <= 'Z' {
                ch = ch+'a'-'A'
            }
        }
        iin.line += string(ch);
        iin.Redraw();
    }
EXIT:
    return iin.line + iin.right;
}

func getline_main(){
    line := xgetline(0,"",nil)
    fprintf(stderr,"%s\n",line);
/*
    dp = strpbrk(line,"\r\n");
    if( dp != NULL ){
        *dp = 0;
```

```
    }

    if( 0 ){
        fprintf(stderr,"\n(%d)\n",int(strlen(line)));
    }
    if( lseek(3,0,0) == 0 ){
        if( romkanmode ){
            var buf [8*1024]byte;
            convs(line,buff);
            strcpy(line,buff);
        }
        write(3,line,strlen(line));
        ftruncate(3,lseek(3,0,SEEK_CUR));
        //fprintf(stderr,"outsize=%d\n",(int)lseek(3,0,SEEK_END));
        lseek(3,0,SEEK_SET);
        close(3);
    }else{
        fprintf(stderr,"\r\ngotline: ");
        trans(line);
        //printf("%s\n",line);
        printf("\n");
    }
*/
}
//== end ========================================================== getline

//
// $USERHOME/.gsh/
//      gsh-rc.txt, or gsh-configure.txt
//             gsh-history.txt
//             gsh-aliases.txt // should be conditional?
//
func (gshCtx *GshContext)gshSetupHomedir()(bool) {
    homedir,found := userHomeDir()
    if !found {
        fmt.Printf("--E-- You have no UserHomeDir\n")
        return true
    }
    gshhome := homedir + "/" + GSH_HOME
    _, err2 := os.Stat(gshhome)
    if err2 != nil {
        err3 := os.Mkdir(gshhome,0700)
        if err3 != nil {
            fmt.Printf("--E-- Could not Create %s (%s)\n",
                gshhome,err3)
            return true
        }
        fmt.Printf("--I-- Created %s\n",gshhome)
    }
    gshCtx.GshHomeDir = gshhome
    return false
}
func setupGshContext()(GshContext,bool){
    //gshPA := syscall.ProcAttr {
    gshPA := os.ProcAttr {
        "", // the staring directory
        os.Environ(), // environ[]
        //[]uintptr{os.Stdin.Fd(),os.Stdout.Fd(),os.Stderr.Fd()},
        []*os.File{os.Stdin,os.Stdout,os.Stderr},
        nil, // OS specific
    }
    cwd, _ := os.Getwd()
    gshCtx := GshContext {
        cwd, // StartDir
        "", // GetLine
        []GChdirHistory { {cwd,time.Now(),0} }, // ChdirHistory
        gshPA,
        []GCommandHistory{}, //something for invokation?
        GCommandHistory{}, // CmdCurrent
        false,
        []os.ProcessState{}, //[]int{},
        aRusage{},
        "", // GshHomeDir
        Ttyid(),
        false,
        false,
        []PluginInfo{},
        []string{},
        " ",
        "v",
        ValueStack{},
        GServer{"",""}, // LastServer
        "", // RSERV
        cwd, // RWD
        CheckSum{},
    }
    err := gshCtx.gshSetupHomedir()
    return gshCtx, err
}
func (gsh*GshContext)gshelllh(gline string)(bool){
    ghist := gsh.CmdCurrent
    ghist.WorkDir,_ = os.Getwd()
    ghist.WorkDirX = len(gsh.ChdirHistory)-1
    //fmt.Printf("--D--ChdirHistory(@%d)\n",len(gsh.ChdirHistory))
    ghist.StartAt = time.Now()
    rusagev1 := Getrusagev()
    gsh.CmdCurrent.FoundFile = []string{}
    fin := gsh.tgshelll(gline)
    rusagev2 := Getrusagev()
    ghist.Rusagev = RusageSubv(rusagev2,rusagev1)
    ghist.EndAt = time.Now()
    ghist.CmdLine = gline
    ghist.FoundFile = gsh.CmdCurrent.FoundFile

    /* record it but not show in list by default
    if len(gline) == 0 {
        continue
    }
    if gline == "hi" || gline == "history" { // don't record it
        continue
    }
    */
    gsh.CommandHistory = append(gsh.CommandHistory, ghist)
    return fin
}
// <a name="main">Main loop</a>
func script(gshCtxGiven *GshContext) (_ GshContext) {
    gshCtxBuf,err0 := setupGshContext()
    if err0 {
        return gshCtxBuf;
    }
    gshCtx := &gshCtxBuf

    //fmt.Printf("--I-- GSH_HOME=%s\n",gshCtx.GshHomeDir)
    //resmap()

    /*
    if false {
        gsh_getlinev, with_exgetline :=
             which("PATH",[]string{"which","gsh-getline","-s"})
        if with_exgetline {
            gsh_getlinev[0] = toFullpath(gsh_getlinev[0])
            gshCtx.GetLine = toFullpath(gsh_getlinev[0])
        }else{
        fmt.Printf("--W-- No gsh-getline found. Using internal getline.\n");
        }
    }
    */

    ghist0 := gshCtx.CmdCurrent // something special, or gshrc script, or permanent history
    gshCtx.CommandHistory = append(gshCtx.CommandHistory,ghist0)

    prevline := ""
    skipping := false
    for hix := len(gshCtx.CommandHistory); ; {
        gline := gshCtx.getline(hix,skipping,prevline)
        if skipping {
            if strings.Index(gline,"fi") == 0 {
                fmt.Printf("fi\n");
                skipping = false;
            }else{
                //fmt.Printf("%s\n",gline);
            }
            continue
        }
        if strings.Index(gline,"if") == 0 {
            //fmt.Printf("--D-- if start: %s\n",gline);
            skipping = true;
            continue
        }
        if false {
            os.Stdout.Write([]byte("gotline:"))
```

```
            os.Stdout.Write([]byte(gline))
            os.Stdout.Write([]byte("\n"))
        }
        gline = strsubst(gshCtx,gline,true)
        if false {
            fmt.Printf("fmt.Printf %%v - %v\n",gline)
            fmt.Printf("fmt.Printf %%s - %s\n",gline)
            fmt.Printf("fmt.Printf %%x - %s\n",gline)
            fmt.Printf("fmt.Printf %%U - %s\n",gline)
            fmt.Printf("Stouut.Write -")
            os.Stdout.Write([]byte(gline))
            fmt.Printf("\n")
        }
        /*
        // should be cared in substitution ?
        if 0 < len(gline) && gline[0] == '!' {
            xgline, set, err := searchHistory(gshCtx,gline)
            if err {
                continue
            }
            if set {
                // set the line in command line editor
            }
            gline = xgline
        }
        */
        fin := gshCtx.gshelllh(gline)
        if fin {
            break;
        }
        prevline = gline;
        hix++;
    }
    return *gshCtx
}
func ftest(where, path string){
    //fi,err := os.Stat(path);
    //fmt.Printf("-- %v os.Stat(%v)=(%v)%v\n",where,path,err,fi);
}
func main() {
    initGshEnv();
    ftest("gsh-main",".");
    ftest("gsh-main","gsh.go");
    ftest("gsh-main","gsh.exe");
    ftest("gsh-main","gsh");

    gshCtxBuf := GshContext{}
    gsh := &gshCtxBuf
    argv := os.Args

    if( isin("wss",argv) ){
        gj_server(argv[1:]);
        return;
    }
    if( isin("wsc",argv) ){
        gj_client(argv[1:]);
        return;
    }
    if 1 < len(argv) {
        if isin("version",argv){
            gsh.showVersion(argv)
            return
        }
        if argv[1] == "gj" {
            if argv[2] == "listen" { go gj_server(argv[2:]); }
            if argv[2] == "server" { go gj_server(argv[2:]); }
            if argv[2] == "serve"  { go gj_server(argv[2:]); }
            if argv[2] == "client" { go gj_client(argv[2:]); }
            if argv[2] == "join"   { go gj_client(argv[2:]); }
        }
        comx := isinX("-c",argv)
        if 0 < comx {
            gshCtxBuf,err := setupGshContext()
            gsh := &gshCtxBuf
            if !err {
                gsh.gshellv(argv[comx+1:])
            }
            return
        }
    }
    if 1 < len(argv) && isin("-s",argv) {
    }else{
        gsh.showVersion(append(argv,[]string{"-l","-a"}...))
    }
    script(nil)
    //gshCtx := script(nil)
    //gshelll(gshCtx,"time")
}

//</div></details>
//<details id="gsh-todo"><summary>Considerations</summary><div class="gsh-src">
// - inter gsh communication, possibly running in remote hosts -- to be remote shell
// - merged histories of multiple parallel gsh sessions
// - alias as a function or macro
// - instant alias end environ export to the permanent > ~/.gsh/gsh-alias and gsh-environ
// - retrieval PATH of files by its type
// - gsh as an IME with completion using history and file names as dictionaies
// - gsh a scheduler in precise time of within a millisecond
// - all commands have its subucomand after "---" symbol
// - filename expansion by "-find" command
// - history of ext code and output of each commoand
// - "script" output for each command by pty-tee or telnet-tee
// - $BUILTIN command in PATH to show the priority
// - "?" symbol in the command (not as in arguments) shows help request
// - searching command with wild card like: which ssh-*
// - longformat prompt after long idle time (should dismiss by BS)
// - customizing by building plugin and dynamically linking it
// - generating syntactic element like "if" by macro expansion (like CPP) >> alias
// - "!" symbol should be used for negation, don't wast it just for job control
// - don't put too long output to tty, record it into GSH_HOME/session-id/comand-id.log
// - making canonical form of command at the start adding quatation or white spaces
// - name(a,b,c) ... use "(" and ")" to show both delimiter and realm
// - name? or name! might be useful
// - htar format - packing directory contents into a single html file using data scheme
// - filepath substitution shold be done by each command, expecially in case of builtins
// - @N substition for the history of working directory, and @spec for more generic ones
// - @dir prefix to do the command at there, that means like (chdir @dir; command)
// - GSH_PATH for plugins
// - standard command output: list of data with name, size, resouce usage, modified time
// - generic sort key option -nm name, -sz size, -ru rusage, -ts start-time, -tm mod-time
//   -wc word-count, grep match line count, ...
// - standard command execution result: a list of string, -tm, -ts, -ru, -sz, ...
// - -tailf-filename like tail -f filename, repeat close and open before read
// - max. size and max. duration and timeout of (generated) data transfer
// - auto. numbering, aliasing, IME completion of file name (especially rm of quieer name)
// - IME "?" at the top of the command line means searching history
// - IME %d/0x10000/ %x/ffff/
// - IME ESC to go the edit mode like in vi, and use :command as :s/x/y/g to edit history
// - gsh in WebAssembly
// - gsh as a HTTP server of online-manual
//---END--- (^-^)//ITS more</div></details>

//<span class="gsh-golang-data">

var WorldDic = //<span id="gsh-world-dic">
"data:text/dic;base64,"+
"Ly8gTXlJTUUvMC4wLjEg6L6e5pu4ICgyMDIwLTA4MTlhKQpzZWthaSDkuJbnlYwKa28g44GT"+
"Cm5uIOOCkwpuaSDjgasKY2hpIOOBoQp0aSDjgaEKaGEg44GvCnNlIOOBmwprYSDjgYsKaSDj"+
"gYQK";
//</span>

var WnnDic = //<span id="gsh-wnn-dic">
"data:text/dic;base64,"+
"PGllldGEgY2hhcnNldD0iVVRGLTgiPgo8dGV4dGFyZWEgY29scz04MCByb3dzPTQwPgovL2Rp"+
"Y3JlcglHU2hlbGxcOlNRVxzZGljdGlvbmFyeVxzZm9yXHNXbm5ccy8vXHMyMDIwLTA4MzAK"+
"R1NoZWxsCUdTaGVsbArjgo/jgZcJ56eBChdhdGFzaGkJ56eBChdhdGFzaQnnp4EK44Gq"+
"44G+44GICeWQjeWJjQpuYW1hZQnlkI3liY0K44Gq44GL44GuCeS4remHjpuYWthbm8J5Lit"+
"6YeOCndhCeOCjwp0YQnjgZ8Kc2kJ44GXCnNoaQnjgZcKbm8J44GuCm5hCeOBqgptYQnjgb4K"+
"ZQnjgYqKaGEJ44GvCm5hCeOBqgprYQnjgYsKbm8J44GuCmRlCeOBpwpzdQnjgZkKZVxzCWVj"+
"aG8KZGljCWRpYwplY2hvCWVjaG8KcmVwbGF5CXJleGxheQpyZXBlYXQJcmVwZWF0CmR0CWRh"+
"dGVccysnJVklbSVkL8VIOiVNOiVTJwp0aW9uCXRpb24KJXQJJXQJLy8gdG8gYmUgYW4gYWNO"+
"aW9uCjwvdGV4dGFyZWE+Cg=="
//</span>

var SumomoDic = //<span id="gsh-sumomo-dic">
"data:text/dic;base64,"+
"PGllldGEgY2hhcnNldD0iVVRGLTgiPgo8dGV4dGFyZWEgY29scz04MCByb3dzPTQwPgovL3Zl"+
"cglHU2hlbGxcOlNRVxzZGljdGlvbmFyeVxzZm9yXHNTdWlvbW9ccy8vXHMyMDIwLTA4MzAK"+
"c3UJ44GZCm1vCeOCggpubwnjga4KdQnjgYYKY2hpCeOBoQp0aQnjgaEKdWNoaQnlhoUKdXRp"+
"CeWGhQpzdW1vbW8J44GZ44KC44KCCnNlbW9tb21vCeOBmeOCguOCggptb21vCeahgwpt"+
"b21vbW8J5gGD44KCCiwsCeOAgQouLgnjgIIKPC90ZXh0YXJlYT4K"
//</span>
```

```
var SijimiDic = //<span id="gsh-sijimi-dic">
"data:text/dic;base64,"+
"PGlldGEgY2hhcnNldD0iVVRGLTgiPgo8dGV4dGFyZWEgY29scz04MCByb3dzPTQwPgovL3Zl"+
"cglHU2hlbGxcc0lNRVxzZGljdclvbmFyeVxzZm9yXHNTaGlqa1pXHMvL1xzMjAyMC0wODMw"+
"CnNpCeOBlwpzaGkJ44GXCmppCeOBmAptaQnjgb8KbmEJ44GqCmplCeOBmOOChQp4eXUJ44KF"+
"CnUJ44GGCm5pCeOBqwprbwnjgZMKYnUJ44G2Cm5uCeOCkwpubwnjga4KY2hpCeOBoQp0aQnj"+
"gaEKa2EJ44GLCnJhCeOCiQosLAnjgIEKLi4J44CCCnhuYW5hCeS4gwp4anV1CeWNgQp4bmkJ"+
"51qMCmtveAnlgIsKa29xCeWAiwprb3gJ5YCLCm5hbmFqdXVuaXgJNzIKbmFuYWp1dW5peHgJ"+
"77yX77yScm5hbmFqdXVuaVgJ77yX7ySCuS4g+WNgeS6jHgJNzIKa29idW5uCeWAi+WIhgp0"+
"aWthcmFxCeOBoeOBi+OCiQp0aWthcmEJ5YqbCmNoaWthcmEJ5YqbCjwvdGV4dGFyZWE+Cg=="
//</span>

var JA_JKLDic = //<span id="gsh-ja-jkl-dic">
"data:text/dic;base64,"+
"Ly92ZXJsCU15SU1FamRpY2ptb3JzZWpKQWpKS0woMjAyMGowODE5KSheLV4pLlNhd3Q94SVRT"+
"CmtqamprbCtqa2tsa2psIOS4lueVjApqamtqamwJ44GCCmtqbAnjgYQKa2tqbAnjgYYKamtq"+
"amwJ44GICmtqa2trbAnjgYoKa2pra2wJ44GLCmpramtrbAnjgY0Ka2tramwJ44GPCmpramps"+
"CeOBkQpqampqbAnjgZMKamtqa2psCeOBlQpqamtqa2wJ44GXCmpqamtqbAnjgZkKa2pqamts"+
"CeOBmwpqamprbAnjgZ0KamtsCeOBnwpra2prbAnjgaEKa2pqa2wJ44GkCmtqa2pqbAnjgaYK"+
"a2tqa2tsCeOBqApramtsCeOBqgpqa2prbAnjgasKa2tra2wJ44GsCmpqa2psCeOBrQpra2pq"+
"bAnjga4Kamtra2wJ44GvCmpqa2tqbAnjgbIKampra2wJ44G1CmtsCeOBuApqa2tsCeOBuwpq"+
"a2tqbAnjgb4Ka2tqa2psCeOBvwpqbAnjgoAKamtra2psCeOCgQpqa2tqa2wJ44KCCmtqamwJ"+
"44KECmpra2pqbAnjgoYKampsCeOCiApra2tsCeOCiQpqamtsCeOCigpqa2pqa2wJ44KLCmpq"+
"amwJ44KMCmtqa2psCeOCjQpqa2psCeOCjwpramtramwJ44KQCmtqamtrbAnjgpEKa2pqamwJ"+
"44KSCmtqa2prbAnjgpMKa2pqa2psCeODvApra2wJ44KbCmtramprbAnjgpwKa2pramtqbAnj"+
"gIEK";
//</span>

//</span>
/*
<style id="gsh-references-style">
#references details { font-family:Georgia; }
#references a { font-family:Georgia; }
.wrap { white-space:normal; }
</style>
<details id="references"><summary>References</summary><div class="gsh-src">
Web technology
  <a href="https://html.spec.whatwg.org">HTML: The Living Standard</a> (September 2020)
    <a href="https://html.spec.whatwg.org/dev/">Developer Version</a>

  <a href="https://drafts.csswg.org">CSS Working Group Editor Drafts</a> (September 2020)

  <a href="https://developer.mozilla.org/ja/docs/Web">MDN web docs</a>
    <a href="https://developer.mozilla.org/ja/docs/Web/HTML/Element">HTML</a>
    <a href="https://developer.mozilla.org/en-US/docs/Web/CSS">CSS</a> : <span class="wrap">
     <a href="https://developer.mozilla.org/en-US/docs/Web/CSS/CSS_Selectors">selectors</a>
     <a href="https://developer.mozilla.org/en-US/docs/Web/CSS/background-repeat">repeat</a></span>
    <a href="https://developer.mozilla.org/en-US/docs/Web/JavaScript">JavaScript</a>
    <a href="https://developer.mozilla.org/en-US/docs/Web/HTTP">HTTP</a>
    <a href="https://mdn-web-dna.s3-us-west-2.amazonaws.com/MDN-Browser-Compatibility-Report-2020.pdf">MDN Browser Compatibility Report (2020)</a>

Go language (August 2020 / Go 1.15)
  <a href="https://golang.org">The Go Programming Language</a>
    <a href="https://golang.org/pkg/">Packages</a>
      <a href="https://godoc.org/golang.org/x/net/websocket">WebSocket</a>

<a href="https://stackoverflow.com/">Stackoverflow</a>
<!--
<iframe src="https://golang.org" width="100%" height="300"></iframe>
-->
</div></details>
*/
/*
<details id="html-src" onclick="frame_open();"><summary>Raw Source</summary><div>

<!-- h2>The full of this HTML including the Go code is here.</h2 -->
<details id="gsh-whole-view"><summary>Whole file</summary>
 <a name="whole-src-view"></a>
 <span id="src-frame"></span><!-- a window to show source code -->
</details>

<details id="gsh-style-frame" onclick="fill_CSSView()"><summary>CSS part</summary>
 <a name="style-src-view"></a>
 <span id="gsh-style-view"></span>
</details>

<details id="gsh-script-frame" onclick="fill_JavaScriptView()"><summary>JavaScript part</summary>
 <a name="script-src-view"></a>
 <span id="gsh-script-view"></span>
</details>

<details id="gsh-data-frame" onclick="fill_DataView()"><summary>Builtin data part</summary>
 <a name="gsh-data-frame"></a>
 <span id="gsh-data-view"></span>
</details>

</div></details>
*/

/*
<div id="GshFooter0"></div>
<!-- 2020-09-17 SatoxITS, visible script { -- >
<details><summary>GJScript</summary>
<style>.gjscript { font-family:Georgia; }</style>
<pre id="gjscript_1" class="gjscript"> function gjtest1(){ alert('Hello GJScript!'); }
  gjtest1()
</pre>
<script>
  gjs = document.getElementById('gjscript_1');
  //eval(gjs.innerHTML);
  //gjs.outerHTML = ""
</script>
</details><!-- ---------- END-OF-VISIBLE-PART ---------- } -->

<!--
// 2020-0906 added,
https://developer.mozilla.org/en-US/docs/Web/CSS/z-index
https://developer.mozilla.org/en-US/docs/Web/CSS/position
-->
<span id="GshGrid">(^_^)//<small>{Hit j k l h}</small></span>

<span id="GStat"><br>
</span>
<span id="GMenu" onclick="GShellMenu(this)" draggable="true"></span>
<span id="GTop"></span>
<div id="GShellPlane" onclick="showGShellPlane();"></div>
<div id="RawTextViewer"></div>
<div id="RawTextViewerClose" onclick="hideRawTextViewer()"> CLOSE </div>

<style id="GshStyleDef">
 #LineNumbered table,tr,td {
   margin:0;
   padding:4px;
   spacing:0;
   border:12px;
 }
 textarea.LineNumber {
   font-size:12px;
   font-family:monospace,Courier New;
   color:#282;
   padding:4px;
   text-align:right;
 }
 textarea.LineNumbered {
   font-size:12px;
   font-family:monospace,Courier New;
   padding:4px;
   wrap:off;
 }
 #RawTextViewer{
   z-index:0;
   position:fixed; top:0px; left:0px;
   width:100%; xxxheight:50px; xheight:0px;
   overflow:auto;
   color:#fff; background-color:rgba(128,128,256,0.2);
   font-size:12px;
   spellcheck:false;
 }
 #RawTextViewerClose{
   z-index:0;
   position:fixed; top:-100px; left:-100px;
   color:#fff; background-color:rgba(128,128,256,0.2);
   font-size:20px; font-family:Georgia;
   white-space:pre;
 }
 #xxxGShellPlane{
   z-index:0;
   position:fixed; top:0px; left:0px;
   width:100%; height:50px;
   overflow:auto;
   color:#fff; background-color:rgba(128,128,256,0.3);
```

```
    font-size:12px;
  }
  #xxxGTop{
    z-index:9;
    opacity:1.0;
    position:fixed; top:0px; left:0px;
    width:320px; height:20px;
    color:#fff; background-color:rgba(32,32,160,0.15);
    color:#fff; font-size:12px;
  }
  #xxxGPos{
    z-index:12;
    position:fixed; top:0px; left:0px;
    opacity:1.0;
    width:640px; height:30px;
    color:#fff; background-color:rgba(0,0,0,0.2);
    color:#fff; font-size:12px;
  }
  #GMenu{
    z-index:100000000;
    position:fixed; top:250px; left:0px;
    opacity:1.0;
    width:100px; height:100px;
    color:#fff;
    color:#fff; background-color:rgba(0,0,0,0.0);
    color:#fff; font-size:16px; font-family:Georgia;
    background-repeat:no-repeat;
  }
  #xxxGStat{
    z-index:8;
    xopacity:0.0;
    position:fixed; top:20px; left:0px;
    xwidth:640px;
    width:100%; height:90px;
    color:#fff; background-color:rgba(0,0,128,0.04);
    font-size:20px; font-family:Georgia;
  }
  #GLog{
    z-index:10;
    position:fixed; top:50px; left:0px;
    opacity:1.0;
    width:640px; height:60px;
    color:#fff; background-color:rgba(0,0,128,0.10);
    font-size:12px;
  }
  #GshGrid {
    z-index:11;
    xopacity:0.0;
    position:fixed; top:0px; left:0px;
    width:320px; height:30px;
    color:#9f9; font-size:16px;
  }
  xbody {display:none;}
  .gsh-link{color:green;}
  #gsh {border-width:1;margin:0;padding:0;}
  #gsh {font-family:monospace,Courier New;color:#ddf;font-size:8px;}
  #gsh header{height:100px;}
  #xgsh header{height:100px;background-image:url(GShell-Logo00.png);}
  #GshMenu{font-size:14pt;color:#c44;}
  .GshMenu{font-size:14pt;color:#c44;}
  .GshMenu1{
     font-size:14pt;color:#2a2;padding:4px; text-align:right;
  }
  .GshMenu1:hover{
     font-size:14pt;color:#fff;font-wait:bold;background-color:#2a2;
  }
  #GshFooter{height:100px;background-size:80px;background-repeat:no-repeat;}
  #gsh note{color:#000;font-size:10pt;}
  #gsh h2{color:#24a;font-family:Georgia;font-size:18pt;}
  #gsh h3{color:#24a;font-family:Georgia;font-size:16pt;}
  #gsh details{color:#888;background-color:#fff;font-family:monospace;}
  #gsh summary{font-size:16pt;color:#fff;background-color:#8af;xxxheight:30px;}
  #gsh summary{font-size:16pt;color:#fff;
     padding:2pt;
     line-height:1.0;
     vertical-align:middle;
     xxx-background-color:#8af;
     background-color:#6881AD;xxx-PBlue;
     xxxheight:30px;
  }
  #gsh pre{font-size:11pt;color:#223;background-color:#faffff;}
  #gsh a{color:#24a;}
  #gsh a[name]{color:#24a;font-size:16pt;}
  #gsh .gsh-src{white-space:pre;font-family:monospace,Courier New;font-size:11pt;}
  #gsh .gsh-src{background-color:#faffff;color:#223;}
  #gsh-src-src{spellcheck:false}
  #SrcTextarea{white-space:pre;font-family:Courier New;font-size:10pt;}
  #SrcTextarea{background-color:#faffff;color:#223;}
  .gsh-code {white-space:pre;font-family:Courier New !important;}
  .gsh-code {color:#024;font-size:11pt; background-color:#fafaff;}
  .gsh-golang-data {display:none;}
  #gsh-WinId {color:#000;font-size:14pt;}

  .gsh-document {font-size:11pt;background-color:#fff;font-family:Georgia;}
  .gsh-document {color:#000;background-color:#fff !important;}
  .gsh-document > h2{color:#000;background-color:#fff !important;}
  .gsh-document details{color:#000;background-color:#fff;font-family:Georgia;}
  .gsh-document p{max-width:550pt;color:#000;background-color:#fff;font-family:Georgia;}
  .gsh-document address{width:500pt;color:#000;background-color:#fff;font-family:Georgia;}

  @media print {
   #gsh pre{font-size:11pt !important;}
  }
</style>

<!--
// Logo image should be drawn by JavaScript from a meta-font.
// CSS seems not follow line-splitted URL
-->
<script id="gsh-data">
//GSellLogo="QR-ITS-more.jp.png"
GSellLogo="\
```


```
iVBORw0KGgoAAAANSUhEUgAAAQEAAAB/CAYAAADvs3f4AAAAAXNSR0IArs4c6QAAAHhlWElm\
TU0AKgAAAAgABAEaAAUAAAABAAAAPgEbAAUAAAABAAAARgEoAAMAAAABAAIAAIdpAAQAAAAB\
AAAATgAAAAAAAABIAAAAAQAAAEgAAAABAAOgAQADAAAAAQABAACgAgAEAAAAAQAAAQGgAwAE\
AAAAAQAAAH8AAAAAYx1BhgAAAAlwSFlzAAALEwAACxMBAJqcGAAAF3RJREFUeAHtnQuUFNWZ\
x++t7ukZ3iCggO/jY6Osb8WgMzAvn7uG4+bISTR7YnQXdQPCkGj2aNwlD2MSlRkeUaPnoCdu\
4iuJx7jriYZ50DOGmF2VqIBEiSggCoiMMA+mu+vu//ZMD9U1dau6a2aUbv91GKrq3vvdx6x/q\
fnXvdx8tBA8SIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAES\
IAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAES\
IAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAES\
IAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIAESIIFDl4A8dLP2\
2eXs9H9+ftSkSdHxsic2qqdE7YusS+1qaalKfnY5YsokMHwEPtdK4MQFz5UeExlbLYSaYUl5\
npDiLKXEZClFiRM53JSUaq9ScqcU6i+2kK3StuONy5reEGKJ7Qw7mOvKec2ToqOiZwoljhFS\
jbOVHCstMRb3USXEJ8hFu7DsdmFb2+xU4vWWFVXbBpMeZUlAE/hcKoGab66eKGOlNykh56PC\
HxH2VVBKoRKqh3qUeKi1YdaOfONJ56OkdI6w5BwomnOQlyPzi0N9DLmXpFK/60p2P/Piyovf\
N8mfM+/nJWNGnj1Ril1gn3ij0Vk7YsoWVMzEuVPfPlRkYdfOak2LRSB0q\
zrWocCOG6qEhvgRaCj/dktj3g7dXXH4gKN6aRS0zpYzerqS6RAoZDQqfk79SKTRXHu/e+9FN\
L66as88pU/PN1pNlTLQJKSc73dPXSr20ur7iiwPcC8QhbnNnCyhUIlryyOTQvYF5JfvqBL7jx\
+cNHjBj5gJRyDl39Hy89+FGCEvWGgAExB83eXMoLY\
rikbd9gHEP52VgQl4h89FUA6kJyYFbbQbnzLJg4zFiesnDHCwvUoeiVQOb/5C9FY9DlUueOH\
+zGhUh9nSqOqrm0uWgurkI9RpjBD4Y6uQcQdD5TUOW63zD3MHesy14V49isbdKyxbGHlCpFR\
UJ6toACF7F9VF58NBfDHT0MBaE74Ent+eWrrWr+Lz/QTw60AdB7QJUjps/OA7cOoBNBCeMUZ\
ttCu/coG28fLpvKEl1TPFV8juRasEahbHvxaR1guoeBPyfUDo4+OfeBdyb8L4tz9XeSXFAMOc\
bgGgov0g1zgGW4jF392xnHhdc+Mwf3JTjfntZ2yC1YJBJXNUt5KIKycck1sxXRdld5pBiZ5Wi4wQu7tikPBeCOpuW+Kj0sqP8GHNoAZuwL\
iOzuywDhQ9zBr2xoDRqVQFi5QxxH6OwVjRKAAW46pvT+RxAJVLjW7vY9/+CeUBMkl68/rPQn\
mCufKzaldFN/yI8gA5iwC3dkIKhsyvZuCYSVG/KHRfv+rHF12A9bt2d172\
2qNzOvzCDYmfEtNy7Qogk XDXWIKAIQ7cOQZchyADWnerqN5xVXttcJsdGp2OtwqmWJU7A+Eh7\
yhYbUgm1IX7f7K1DwaRyUfN42EM+mgsolk\
d3/ZnBGElXPGUWzXg1YCq5eW5/zBGy54aWOgwWKfnWbqptcevWT4\
aupq7t/bMXX+yw/egJGKoTksy2d+gFBb9VoDvX5BlZTOR+Wfjyyb0pP6XOGOYNqR/quta3vB\
Fgeua6qv2d7vn8dFdV3rldBw34GSPg9i0DG9h5XWknh9kAaMmyJ6dklPzZmtD3cnu77vtw5C\
h/YrG1p7Wxp7Wxp54ymm+8zzKOgyRSPRa4IKoGz1i8b6ytagcEPmb9v/m09cUATz\
Jow6tVnPcMxHzj+sNNpHsCJyja6csrRsMyrGkiwF4I5Uiou1iL1RW7fmNLeX3z2+/GfW1LU2\
Y572b6EAzaHy6sp\
Y572b6EAzkfYoPctJi15Q1nJyLdrFrUZp1/3pmkuG/yN9gAoGyMTf7neVIvx/6CHUghlluh/\
f9Uvo+gG7O3q7rzFL8xQ+zW+/8F6PW6fV7xSXhiNlaywdz2X1ULm/4uL1mPwNoA5uGcdoL9\
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"pk3V2XJOZqXYhQUm4ZcXX8PwfAWm4MlX4ZjFJKZvGuJm8rkxgAMAJsGbPQiTCbZvRCfQfUHV"+
"vMkq+Rm+jFoFHhqZ33Kd4pWS/4vQIv7BqK98xppyuiIFFXHWq68cfF3vSc0NXOZpBAEL27sx8T"+
"QLqO6JXGFZLTcyc8BkqVprZBz7PeUxZuS3pPNc8MsKnSf9pVmFyWELLyeKqUEZE6ruQYX4v9ZrBR"+
"wZXdDLn4sjA1i3X8Q88BJ0aYZyLaP2nH6zlVpCSwL5K8PgyvMYQmwXYq+TvZvyRVm6LPcuiBcv"+
"H6pO6jW/m/XQ7rhmEsZB5vuN6lmBO7eJ+hzX/6PcrAjpeXXTJpO6Ep4yWqj8w3nBU/pEzZ"+
"bQ6NkfJBJrwyiSGNmzO3KIaQ8UNZ8HgbFc+LY9/D8h5mYXRv8rpwJxRGjbWoB99xiMTbOa"+
"WaRoHQ3jvTrSbOEHSiPT02A4/eULyjKUKyhHbbRBHpTn67VTx3PX6MgWZdPULF5qzRmj1vSNEG"+
"K4qbUAHsIUq8Op1A3D4GHKadcX/RZHzGs5cGPcEmPsgLkXa6WEWwAqFphLmrW7Me7T39AXUJ4Q"+
"XR2a8BIwMiPpOfJ4x3kZ8NtLJGbBLpAIR4Lnc3n/Oi7t6ETaDN5SBsxaxd0Qz67TP8iaB72v7ObeP"+
"Tuz0qV2z5Ybzx+mwrvBo6P8PgXV2o2w7K8Da8YhD2KcQBCiAA6rdQWZVOPmnrhNDWr0yZpkq"+
"LEgD3J9ACdqlw/HaZmzsApM1u+sJnq5EY8xvhW/kR9Nbj+UNVTfeA0Wb3Pk6b/ZbppNNyt6TIeZ"+
"Q9BNFOYeGbmEa7pxRnNAdcAZ6f2AEEPFOgiSdbd6LqYH3hbGEJU5ZAH2Y9w0mqvxGTSJhYvJ"+
"TL+VeMbwQ7gi8xyi1DF+NVEwuZ1gnKQm5IZLOugwJPuIOhz0b86pyBsh7mG1QmBJ4Gk"+
"wRGTdHLMZYQDOZjWMMVsZSU7rX0pYamW7PzJx4nM1zz5fe7uFHZFf3BL6UUZUH2K5dVRFKhb"+
"YDXr+7HiSMywmPvEgR4uHvE0rnKwY3OxyFkYqJWUAAAeTHvyQi4TxR7hDjtBfzx5lOMyrZ3ewXXzJ"+
"uHwI+ib2r8Kki1Sbd5R6gFMajKI9g0G9Im7hUx0GS7BMU1VBPFMn7ShzYV3Cos9WkRyRcTbAuy"+
"1tTO5L9dSlkEU8T7vkMqVIH1vytvcfdovxuWvbxv0OIxwfHbyjoIhOPqwRNGNoB3zdhL63Y5"+
"OajRiUp3oa+TEdHAkpd2fnGVqN6xR6Y31lGVN5RZvnuDYMV6D1Ap9uX0yGRw1FZtXEfcn1Wkk"+
"8GzEMVgzezeDnM8MJQtTXIDnCE+pBjmiTsn0E5UxW8VhzG33KGkPSBnEZ8Ms4A6oh8w6ahsq"+
"i2bL1SIDP8H9N1AXazdkrj3MD6FlB7LPk9C2dtZIRLrNyDTSb0Q+f2CT3fp67H8iKpd/RmgS5"+
"3zqxZAYYPsNrRfDGGlwkVpYPRlm6fD4hg72I2hwKxtgsYIQOApUiDRTvUmOz+AZXXlm4NIUJk"+
"VyBlddqcJGGi3vF/dzdQLRkYBhKsrEpGVL3xTr85l1vDhNpfGHBhr0hEF0LrS2cX39wDjLs29pY"+
"BWcNpVJBzWkvxKVOsy7fLvAdJjOUjC1fCq3wVZa+Eg0dLxO24+uswaJy2qYzgBzkOpiwrrdmJ3"+
"I6uX0gCRmIwzSwsUbEXYc/Z33aDqBGsDSI12WC7lyoJl2tQBr8EHXqsHe6v9qIKR6Nlu75G0fHs"+
"DGDj/DQHWw3bHfDJePndjqAJN6U9FkdOQ3w1ZlEw2Bx2lIe6fW21WH6ZQYX1HqpOcHh9R"+
"X7VXULvV0jxg6J2WVxrB+E0NhWRUnVQvTK8gDiR7O8c4QBcvK6RgzvmZa9hxlcF/sMtcA"+
"8qmMTxJUTpTHlfh1KUg3JKZjMWZw1TZEH2M8aJthhBHcexSgJ7U5XsrXEc5tdM5l1s5xW4p"+
"wIVmMR5s5n3hpazX9l58LDzxpJYBxUgrWN9hD5P1Ef4atHd2wAn8KqadeQ3XTQZr8S7SYO"+
"0XOl7aPNFaeZYd6SJF1fWTn3rWyiMp2JAiKO6Ffmf3ZcDuMTHGaq4blKD5OYEp0hXn8b2DPZG"+
"MN3W8aRjZWZ9+9IHaCHNTXyhEy5B0c6Kea+I2ysSEWZfB5VfFHw9BoRsNQBYj2x/JySf5c1lKA"+
"dVsnyj1p0WP76mGwHo8eWM0B4hCtGPG4K3Y4mnpZrTm5XgqKjRQuR5m2Hr0IzO9yRtp09jcg"+
"zwEaK4EJBhr99UvH1lhxYi42i7wUixJYaIS2n7JjsBi3Kmu0PQuJw9mSdb9O0NzGaB9jMWQ/z"+
"ETH41OpRiCLG9NydWMVQY+JLXrDTyyj0v62c1xoHvVNN4yLz18+zZIgIE8P8xVw3dBZufaWXqF0"+
"S2QhN8gbpq6OcN0O14KhkwLZq1k1uxXRyBzsHXEjuDvP7K0zQQgfx8YnTIuNnSrnZkOM/r8d93"+
"iwXsePnYY3ONs0AVFFM2ShB3zO0npbLMZNwx3kKgnvxYhQOPNJmbHOGVijvOj5ThTwpObnGNkmT"+
"6Zw/u4VNbCOX5MDCmKzSHk6mmqQk8j8e5Md7mWbb8pQLojrhU3B5ctMvwSPs5iqiZoX7sAZ4Yx"+
"q6P1kNlBb5IFOhE0LYYgf/OQVa/wHVpWaTsbAYzEOaXuoUHNE+Ofh8z7y1EYNKqO5G9qAzFaOgc"+
"Y/sj5VgVsm8zMYUgBW3umubvFFKvP2Gm5r8EzV4kdkZVhbt4xTaEKcLpw/jj34zO6nI68TpIC3"+
"JQ+ZqdFmo/errScxiYEff7zqf4AAVCAhXEY1f+Llk6jhYYPS0H74vUKEhfF0mPEzOk/jAgl9"+
```

```
"KsPT//2nUhN0sTw5y1jpXoEYvVMdvwEaEy6JLJoG7vUaN365OguXzM8w7d/YWY6nv2xBOvMW"+
"A4/3B7FD/qnuPFltcOPZV44ZdcljGPkXdxbhYKtyexUzGBNdprLmplaa575yYeuuc18HIlkX"+
"TJneqY7qjhXUQkvbfu4OH6Lxvu2afNPFZ4cbcO8r5bhqmMDpkKzocKGAh6I/4Qrw8raTpqP5"+
"M1Kx+a4i7GxkUjWxyeMaK5lS6yup3j/eUoHjFS6qvXWypHuV6dl4VN+f+e/PScA9a6chkjkB"+
"1XXteIjHZXlRwwd5hhSAbKzCzEp5//5LZXh7jxXOXDI3HW/fXYRDdDmV4z9WmyBCHRSCLFFz"+
"r50w670GW/cq07uxC1W2QyO/q7Ybf8tEq/tvn2GSOJWR/vDzh1DO5GyTXj9Mx0MKwAw5fxRE"+
"uColFLe8cBzbfekmyzivttwzE13M85NhlJyTwEYLssCTaGh/+lEjdn5SbS7dq8zfOo+mP4W4"+
"tAH8c6UbD66YgP9cN8uk2ytL7NHnD2IXD0yyGDUeKbMl6PcCxGEs5d4mD37/d/km30bEKQ3+"+
"62eOYcOBJpNBInUeW8q6lmNL/15ZpjFIUTRJ+6rp47dxZB9fMxnXLMsxoTIZbjG//WgrpnIa"+
"25ktAwSqVcf3vUDQVFlpjrLXcnl69AjX0fxQD6bnJyGFBynL+GHEebEO/Jmpacr7ncDjKTkz"+
"fivcALz+D1Jdr/Sfl+5HA4ZxDrmmpOJh1xXF4ec/mI4lJmPdAaX03PtMCQ5UtCOPTp3qDdel"+
"nSgZVAA2YaJVicr/s78JnjoX02jirdgBj9SvmJ2EUHc3Xj7aZnx/HawqTifhjQRi3AhihEpi"+
"WiFseaFKnX+noQdzmMK3YU0u1jONL5PnfAJlhN39y8No4xF4Or9HGkntVd8WQNApoMr+IBdT"+
"4eg8ppjcx1S6xXMzzLIoZouPNuLNPVXmewFtry/gkpZCzRHxHAzLpdY/6+rqk5BvmPRnhMJx"+
"01Kr5xYyXc3T66OMU942Jdp8L7B0XrrRQHVxmtGd3791Evdur8Uq7h0UMZYv4+tSVQaD3xQY"+
"swBEuOafcoZ2MIP84YXJuJXuppiaI2w6JdrPhOrdTEp4v7Qd+5nxlcf9QBwNps7ootley6hG"+
"V6A+5aJ3kXBlfHbQU84j425K46aJkeaLkSX8YkThr7hobswILYxiK3Xqa0VzAZzY8a5+mLE"+
"YOePiJcVPskdogi9i2ml+maokDlGGgWBDh/XfN8MlZzkN0OMOJlvhqgdfd8MsV4E6yfQTVWO"+
"v/3N0DR+MzSV3wzpizPZGxsaGL3+iLlAL+6owv8da8MK5gMqgXNsBrjfCI5ZA2xC7H8JQWP4"+
"FffdvRTE33AtvnRuKmYzLy8tOWqQKupjByVhdHb1+L4as06jwhnh1eqq3d0nPxuFyfstZbqu"+
"kqC2fFyH1xjQWMwtbdK3+dVYH3W+G5N8yLlVyaXpi06vyde7ZFo85tnfDWbqu8Ewk4Tl0/zA"+
"LayzfIEeBmdrGzvNVOr7bpAZahUNriykdY+mq655LsM8Lvg6NiAYQs1tTnGzBNXQeCkcFYWq"+
"XcB0tRx+HToxNQITEvjlaCy/HOWWVxshfV7m4maojtOpqpFfjjZHoYx2Yy89zggSewFHO44r"+
"i74dGvWXYSMR6icARoQsMSpA0P9F5UitR36ned9DAZBWTCThytOTn6MkxuIKpt+UtuIMzxxq"+
"tCywrgEJjXGWXBrJRI6uvMtYGsurU03AiqOtXG32S8K/CTC8mo689CT5FbU+JLZAyikk+g8E"+
"f+T2e7tu4L/VVlEn8ShhhNF4R/BKiiajfDYbIVVTV6xDHs0yKbXWJV65IFjDY+rzoQ/USKAy"+
"XwcD/s3LIX6sPtRCPIv3UHlCrtyps/n5/BCUfMtF1Hbf5/P/D94Dlz5t1uE3AAAAAElFTkSu"+
"QmC";
</script>

<div id="GJFactory_1" class="xxxGJFactory" style=""></div>
<!--
https://developer.mozilla.org/en-US/docs/Web/CSS/line-height
-->
<style>
  .GJFactory{
    resize:both; overflow:scroll;
    position:static;
    border:1.2px dashed #282; xborder-radius:2px;
    margin:0px; padding:10px !important;
    width:340px; height:340px;
    flex-wrap: wrap;
    color:#fff; background-color:rgba(0,0,0,0.0);
    line-height:0.0;
    xxxcolor:#22a !important;
    text-shadow:2px 2px #ddf;
  }
  .GJFactory h1,h2,h3,h4 {
    xxxcolor:#22a !important;
  }
  xxxinput {
    border:1px dashed #0f0; border-radius:0px;
  }
  .GJWin:hover{
    color:#df8 !important;
    background-color:rgba(32,32,160,0.8) !important;
    line-height:0.0;
  }
  .GJWin:active{
    color:#df8 !important;
    background-color:rgba(224,32,32,0.8) !important;
    line-height:0.0;
  }
  .GJWin:focus{
    color:#df8 !important;
    background-color:rgba(32,32,32,1.0) !important;
    line-height:0.0;
  }
  .GJWin{
    z-index:10000;
    display:inline;
    position:relative;
    flex-wrap: wrap;
    top:0; left:0px;
    width:285px !important; height:205px !important;
    border:1px solid #eea; border-radius:2px;
    margin:0px; padding:0px;
    font-size:8pt;
    line-height:0.0;
    color:#fff; background-color:rgba(0,0,64,0.1) !important;
  }
  .GJTab{
    display:inline;
    position:relative;
    top:0px; left:0px;
    margin:0px; padding:2px;
    border:0px solid #000; border-radius:2px;
    width:90px; height:20px;
    font-family:Georgia;
    font-size:9pt;
    line-height:1.0;
    white-space:nowrap;
    color:#fff; background-color:rgba(0,0,64,0.7);
    text-align:center;
    vertical-align:middle;
  }
  .GJStat:focus{
    color:#df8 !important;
    background-color:rgba(32,32,32,1.0) !important;
    line-height:1.0;
  }
  .GJStat{
    display:inline;
    position:relative;
    top:0px; left:0px;
    margin:0px; padding:2px;
    border:0px solid #00f; border-radius:2px;
    width:166px; height:20px;
    font-family:monospace;
    font-size:9pt;
    line-height:1.0;
    color:#fff; background-color:rgba(0,0,64,0.2);
    text-align:center;
    vertical-align:middle;
  }
  .GJIcon{
    display:inline;
    position:relative;
    top:0px; left:1px;
    border:2px solid #44a;
    margin:0px; padding:1px;
    width:13.2; height:13.2px;
    border-radius:2px;
    font-family:Georgia;
    font-size:13.2px;
    line-height:1.0;
    white-space:nowrap;
    color:#fff; background-color:rgba(32,32,160,0.8);
    text-align:center;
    vertical-align:middle;
    text-shadow:0px 0px;
  }
  .GJText:focus{
    color:#fff !important;
    background-color:rgba(32,32,160,0.8) !important;
    line-height:1.0;
  }
  .GJText{
    display:inline;
    position:relative;
    top:0px; left:0px;
    border:0px solid #000; margin:0px; padding:0px;
    width:280px; height:160px;
    border:0px;
    font-family:Courier New,monospace !important;
    font-size:8pt;
    line-height:1.0;
    white-space:pre;
    color:#fff; xbackground-color:rgba(0,0,64,0.5);
    background-color:rgba(32,32,128,0.8) !important;
  }
  .GJMode{
    display:inline;
    position:relative;
    top:0px; left:0px;
    border:0px solid #000; border-radius:0px;
    margin:0px; padding:0px;
    width:280px; height:20px;
    font-size:9pt;
    line-height:1.0;
    white-space:nowrap;
    color:#fff; background-color:rgba(0,0,64,0.7);
```

```
    text-align:left;
    vertical-align:middle;
  }
</style>

<script id="gsh-script">
  // 2020-0909 added, permanet local storage
  // https://developer.mozilla.org/en-US/docs/Web/API/Window/localStorage
  var MyHistory = ""
  Permanent = localStorage;
  MyHistory = Permanent.getItem('MyHistory')
  if( MyHistory == null ){ MyHistory = "" }
  d = new Date()
  MyHistory = d.getTime()/1000+" "+document.URL+"\n" + MyHistory
  Permanent.setItem('MyHistory',MyHistory)
  //Permanent.setItem('MyWindow',window)

  var GJLog_Win = null
  var GJLog_Tab = null
  var GJLog_Stat = null
  var GJLog_Text = null
  var GJWin_Mode = null
  var FProductInterval = 0

  var GJ_FactoryID = -1
  var GJFactory = null
  if( e = document.getElementById('GJFactory_0') ){
    GJFactory_1.height = 0
    GJFactory = e
    e.setAttribute('class','GJFactory')
    var GJ_FactoryID = 0
  }else{
    GJFactory = GJFactory_1
    var GJ_FactoryID = 1
  }

  function GJFactory_Destroy(){
    gjf = GJFactory
    //gjf = document.getElementById('GJFactory')
    //alert('gfj='+gjf)
    if( gjf != null ){
      if( gjf.childNodes != null ){
          for( i = 0; i < gjf.childNodes.length; i++ ){
              gjf.removeChild(gjf.childNodes[i])
          }
      }
      gjf.innerHTML = ''
      gjf.style.width = 0
      gjf.style.height = 0
      gjf.removeAttribute('style')
      GJLog_Win = GJLog_Tab = GJLog_Stat = GJLog_Text = GJWin_Mode = null
      window.clearInterval(FProductInterval)
      return '-- Destroy: work product destroyed'
    }else{
      return '-- Destroy: work product not exist'
    }
  }

  var TransMode = false
  var onKeyControl = false
  var OnKeyShift = false
  var OnKeyAlt = false
  var OnKeyJ = false
  var OnKeyK = false
  var OnKeyL = false

  function GJWin_OnKeyUp(ev){
    keycode = ev.code;
    if( keycode == 'ShiftLeft' ){
        OnKeyShift = false
    }else
    if( keycode == 'ControlLeft' ){
        onKeyControl = false
    }else
    if( keycode == 'AltLeft' ){
        OnKeyAlt = false
    }else
    if( keycode == 'KeyJ' ){ OnKeyJ = false }else
    if( keycode == 'KeyK' ){ OnKeyK = false }else
    if( keycode == 'KeyL' ){ OnKeyL = false }else
    {
    }
    ev.preventDefault()
  }
  function and(a,b){ if(a){ if(b){ return true; } return false; } }
  function GJWin_OnKeyDown(ev){
    keycode = ev.code;
    mode = ''
    key = ''
    if( keycode == 'ControlLeft' ){
        onKeyControl = true
        ev.preventDefault()
        return;
    }else
    if( keycode == 'ShiftLeft' ){
        OnKeyShift = true
        ev.preventDefault()
        return;
    }else
    if( keycode == 'AltLeft' ){
        ev.preventDefault()
        OnKeyAlt = true
        return;
    }else
    if( keycode == 'Backquote' ){
        TransMode = !TransMode
        ev.preventDefault()
    }else
    if( and(keycode == 'Space', OnKeyShift) ){
        TransMode = !TransMode
        ev.preventDefault()
    }else
    if( keycode == 'ShiftRight' ){
        TransMode = !TransMode
    }else
    if( keycode == 'Escape' ){
        TransMode = true
        ev.preventDefault()
    }else
    if( keycode == 'Enter' ){
        TransMode = false
        //ev.preventDefault()
    }
    if( keycode == 'KeyJ' ){ OnKeyJ = true }else
    if( keycode == 'KeyK' ){ OnKeyK = true }else
    if( keycode == 'KeyL' ){ OnKeyL = true }else
    {
    }

    if( ev.altKey    ){ key += 'Alt+' }
    if( onKeyControl ){ key += 'Ctrl+' }
    if( OnKeyShift   ){ key += 'Shift+' }
    if( and(keycode != 'KeyJ', OnKeyJ) ){ key += 'J+' }
    if( and(keycode != 'KeyK', OnKeyK) ){ key += 'K+' }
    if( and(keycode != 'KeyL', OnKeyL) ){ key += 'L+' }
    key += keycode

    if( TransMode ){
        //mode = "[\343\201\202r]"
        JaAutf8 = new Uint8Array([0343,0201,0202]);
        utf8dec = new TextDecoder();
        JaA =  utf8dec.decode(JaAutf8);
        mode = "[" + JaA + "r]";

    }else{
        mode = '[---]'
    }
    ////  /gjmode.innerHTML = "[---]"
    GJWin_Mode.innerHTML = mode + ' ' + key
    //alert('Key:'+keycode)
    ev.stopPropagation()
    //ev.preventDefault()
  }
  function GJWin_OnScroll(ev){
    x = DragStartX = gsh.getBoundingClientRect().left.toFixed(0)
    y = DragStatty = gsh.getBoundingClientRect().top.toFixed(0)
    GJLog_append('OnScroll: x='+x+',y='+y)
  }
  document.addEventListener('scroll',GJWin_OnScroll)
  function GJWin_OnResize(ev){
    w = window.innerWidth
    h = window.innerHeight
```

```
  GJLog_append('OnResize: w='+w+',h='+h)
}
window.addEventListener('resize',GJWin_OnResize)

var DragStartX = 0
var DragStartY = 0
function GJWin_DragStart(ev){
  // maybe this is the grabbing position
  this.style.position = 'fixed'
  x = DragStartX = this.getBoundingClientRect().left.toFixed(0)
  y = DragStatty = this.getBoundingClientRect().top.toFixed(0)
  GJLog_Stat.value = 'DragStart: x='+x+',y='+y
}
function GJWin_Drag(ev){
  x = ev.clientX; y = ev.clientY // x = ev.pageX; y = ev.pageY
  this.style.left = x - DragStartX
  this.style.top = y - DragStartY
  this.style.zIndex = '30000'
  this.style.position = 'fixed'
  x = this.getBoundingClientRect().left.toFixed(0)
  y = this.getBoundingClientRect().top.toFixed(0)
  GJLog_Stat.value = 'x='+x+',y='+y
  ev.preventDefault()
  ev.stopPropagation()
}
function GJWin_DragEnd(ev){
  x = ev.clientX; y = ev.clientY
  //x = ev.pageX; y = ev.pageY
  this.style.left = x - DragStartX
  this.style.top = y - DragStartY
  this.style.zIndex = '30000'
  this.style.position = 'fixed'
  if( true ){
      console.log("Dropped: "+this.nodeName+'#'+this.id+' x='+x+' y='+y
          +' parent='+this.parentNode.id)
  }
  x = this.getBoundingClientRect().left.toFixed(0)
  y = this.getBoundingClientRect().top.toFixed(0)
  GJLog_Stat.value = 'x='+x+',y='+y
  ev.preventDefault()
  ev.stopPropagation()
}
function GJWin_DragIgnore(ev){
  ev.preventDefault()
  ev.stopPropagation()
}
// 2020-09-15 let every object have console view!
var GJ_ConsoleID = 0
var PrevReport = new Date()
function GJLog_StatUpdate(){
  txa = GJLog_Stat;
  if( txa == null ){
      return;
  }
  tmLap0 = new Date();
  p = txa.parentNode;
  pw = txa.getBoundingClientRect().width;
  ph = txa.getBoundingClientRect().height;
  //txa.value += '#'+p.id+' pw='+pw+', ph='+ph+'\n';
  tx1 = '#'+p.id+' pw='+pw+', ph='+ph+'\n';

  w = txa.getBoundingClientRect().width;
  h = txa.getBoundingClientRect().height;
  //txa.value += 'w='+w+', h='+h+'\n';
  tx1 += 'w='+w+', h='+h+'\n';

  //txa.value += '\n';
  //txa.value += DateShort() + '\n';
  tx1 += '\n';
  tx1 += DateShort() + '\n';
  tmLap1 = new Date();

  txa.value += tx1;
  tmLap2 = new Date();

  // vertical centering of the last line
  sHeight = txa.scrollHeight - 30; // depends on the font-size
  tmLap3 = new Date();

  txa.scrollTop = sHeight; // depends on the font-size
  tmLap4 = new Date();

  now = tmLap0.getTime();
  if( PrevReport == 0 || 10000 <= now-PrevReport ){
      PrevReport = now;
      console.log('StatBarUpdate:'
          + 'leng=' + txa.value.length + ' byte, '
          + 'time='  + (tmLap4 -tmLap0) + 'ms {'
          + 'tadd=' + (tmLap2 -tmLap1) + ', '
          + 'hcal=' + (tmLap3 -tmLap2) + ', '
          + 'scrl=' + (tmLap4 -tmLap3) + '}'
      );
  }
}
GJWin_StatUpdate = GJLog_StatUpdate;
function GJ_showTime1(wid){
  //e = document.getElementById(wid);
  //console.log(wid.id+'.value.length='+wid.value.length)
  if( e != null ){
      //e.value = DateShort();
  }else{
      // should remove the Listener
  }
}
function GJWin_OnResizeTextarea(ev){
  this.value += 'resized:' + '\n'
}
function GJ_NewConsole(wname){
  wid = wname + '_' + GJ_ConsoleID
  GJ_ConsoleID += 1

  GJFactory.style.setProperty('width',360+'px'); //GJFsize
  GJFactory.style.setProperty('height',320+'px')
  e = GJFactory;
  console.log('GJFa #'+e.id+' from w='+e.style.width+', h='+e.style.height)

  if( GJFactory.innerHTML == "" ){
      GJFactory.innerHTML = '<'+'H3>GJ Factory_'+ GJ_FactoryID +'<'+'/H3><'+'hr>\n'
  }else{
      GJFactory.innerHTML += '<'+'hr>\n'
  }

  gjwin = GJLog_Win = document.createElement('span')
  gjwin.id = wid
  gjwin.setAttribute('class','GJWin')
  gjwin.setAttribute('draggable','true')
  gjwin.addEventListener('dragstart',GJWin_DragStart)
  gjwin.addEventListener('drag',GJWin_Drag)
  gjwin.addEventListener('dragend',GJWin_Drag)
  gjwin.addEventListener('dragover',GJWin_DragIgnore)
  gjwin.addEventListener('dragenter',GJWin_DragIgnore)
  gjwin.addEventListener('dragleave',GJWin_DragIgnore)
  gjwin.addEventListener('dragexit',GJWin_DragIgnore)
  gjwin.addEventListener('drop',GJWin_DragIgnore)
  gjwin.addEventListener('keydown',GJWin_OnKeyDown)

  gjtab = GJLog_Tab = document.createElement('textarea')
  gjtab.addEventListener('keydown',GJWin_OnKeyDown)
  gjtab.style.readonly = true
  gjtab.contenteditable = false
  gjtab.value = wid
  gjtab.id = wid + '_Tab'
  gjtab.setAttribute('class','GJTab')
  gjtab.setAttribute('spellcheck','false')
  gjwin.appendChild(gjtab)

  gjstat = GJLog_Stat = document.createElement('textarea')
  gjstat.addEventListener('keydown',GJWin_OnKeyDown)
  gjstat.id = wid + '_Stat'
  gjstat.value = DateShort()
  gjstat.setAttribute('class','GJStat')
  gjstat.setAttribute('spellcheck','false')
  gjwin.appendChild(gjstat)

  gjicon = document.createElement('span')
  gjicon.addEventListener('keydown',GJWin_OnKeyDown)
  gjicon.id = wid + '_Icon'
  gjicon.innerHTML = 'G<font color="#f44">J</font>'
  gjicon.setAttribute('class','GJIcon')
  gjicon.setAttribute('spellcheck','false')
  gjwin.appendChild(gjicon)
```

```
    gjtext = GJLog_Text = document.createElement('textarea')
    gjtext.addEventListener('keydown',GJWin_OnKeyDown)
    gjtext.addEventListener('keyup',GJWin_OnKeyUp)
    gjtext.addEventListener('resize',GJWin_OnResizeTextarea)
    gjtext.id = wid + '_Text'
    gjtext.setAttribute('class','GJText')
    gjtext.setAttribute('spellcheck','false')
    gjwin.appendChild(gjtext)


    // user's mode as of IME
    gjmode = GJWin_Mode = document.createElement('textarea')
    gjmode.addEventListener('keydown',GJWin_OnKeyDown)
    gjmode.addEventListener('keydown',GJWin_OnKeyDown)
    gjmode.id = wid + '_Mode'
    gjmode.setAttribute('class','GJMode')
    gjmode.setAttribute('spellcheck','false')
    gjmode.innerHTML = '[---]'
    gjwin.appendChild(gjmode)

    gjwin.zIndex = 30000
    GJFactory.appendChild(gjwin)

    gjtab.scrollTop = 0
    gjstat.scrollTop = 0

    //x = gjwin.getBoundingClientRect().left.toFixed(0)
    //y = gjwin.getBoundingClientRect().top.toFixed(0)
    //gjwin.style.position = 'static'
    //gjwin.style.left = 0
    //gjwin.style.top = 0

    //update = '{'+wid+'.value=DateShort()}',
    update = '{GJ_showTime1('+wid+');}',
    // 2020-09-19 this causes memory leaks
    //FProductInterval = window.setInterval(update,200)
    //FProductInterval = window.setInterval(GJWin_StatUpdate,200)
    //FProductInterval = window.setInterval(GJ_showTime1,200,wid);
    FProductInterval = window.setInterval(GJ_showTime1,200,gjstat);
    return update
  }
  function xxxGJF_StripClass(){
    GJLog_Win.style.removeProperty('width')
    GJLog_Tab.style.removeProperty('width')
    GJLog_Stat.style.removeProperty('width')
    GJLog_Text.style.removeProperty('width')
    return "Stripped classes"
  }
  function isElem(id){
    return document.getElementById(id) != null
  }
  function GJLog_append(...args){
    txt = GJLog_Text;
    if( txt == null ){
        return; // maybe GJLog element is removed
    }
    logs = args.join(' ')
    txt.value += logs + '\n'
    txt.scrollTop = txt.scrollHeight
    //GJLog_Stat.value = DateShort()
  }
  //window.addEventListener('time',GJLog_StatUpdate)
  function test_GJ_Console(){
    window.setInterval(GJLog_StatUpdate,1000);
    GJ_NewConsole('GJ_Console')
    e = GJFactory;
    console.log('GJF0 #'+e.id+' from w='+e.style.width+', h='+e.style.height)
    e.style.width = 360; //GJFsize
    e.style.height = 320;
    console.log('GJF0 #'+e.id+' to w='+e.style.width+', h='+e.style.height)
  }
  /// test_GJ_Console();

  var StopConsoleLog = true
  // 2020-09-15 added,
  // log should be saved to permanet memory
  // const px = new Proxy(console.log,{ alert() })
  __console_log = console.log
  __console_info = console.info
  __console_warn = console.warn
  __console_error = console.error
  __console_exception = console.exception
  // should pop callstack info.
  console.exception = function(...args){
    __console_exception(...args)
    alert('-- got console.exception("'+args+'")')
  }
  console.error = function(...args){
    __console_error(...args)
    alert('-- got console.error("'+args+'")')
  }
  console.warn = function(...args){
    __console_warn(...args)
    alert('-- got console.warn("'+args+'")')
  }
  console.info = function(...args){
    alert('-- got console.info("'+args+'")')
    __console_info(...args)
  }
  console.xxxlog = function(...args){ // rewrite xxxlog to log to enalbe it
    __console_log(...args)
    if( StopConsoleLog ){
        return;
    }
    if( 0 <= args[0].indexOf('!') ){
        //alert('-- got console.log("'+args+'")')
    }
    GJLog_append(...args)
  }

//document.getElementById('GshFaviconURL').href = GShellFavicon
    //document.getElementById('GshFaviconURL').href = GShellInsideIcon
//document.getElementById('GshFaviconURL').href = ITSmoreQR
//document.getElementById('GshFaviconURL').href = GSellLogo

// id of GShell HTML elemets
var E_BANNER = "GshBanner" // banner element in HTML
var E_FOOTER = "GshFooter" // footer element in HTML
var E_GINDEX = "gsh-gindex" // index of Golang code of GShell
var E_GOCODE = "gsh-gocode" // Golang code of GsHell
var E_TODO   = "gsh-todo"   // TODO of GSHell
var E_DICT   = "gsh-dict"   // Dictionaly of GSHell

function bannerElem(){ return document.getElementById(E_BANNER); }
function bannerStyleFunc(){ return bannerElem().style; }
var bannerStyle = bannerStyleFunc()
function GshSetImages(){
    document.getElementById('GshFaviconURL').href = GShellInsideIcon
    bannerStyle.backgroundImage = "url("+GSellLogo+")";
    //bannerStyle.backgroundImage = "url("+GShellInsideIcon+")";
    //bannerStyle.backgroundImage = "url("+GShellFavicon+")";
    //GMenu.style.backgroundImage = "url("+GShellInsideIcon+")";
    //showFooter();
}
function GshInsideIconSetup(){
    GMenu.style.backgroundImage = "url("+GShellInsideIcon+")";
    GMenu.style.zIndex = 10000000;
    //GMenu.style.left = window.innerWidth - 100
    GMenu.style.left = 0;
    GMenu.style.top = window.innerHeight - 90; // - 200
    window.addEventListener('resize',GshInsideIconSetup);
}

function footerElem(){ return document.getElementById(E_FOOTER); }
function footerStyle(){ return footerElem().sytle; }
//footerElem().style.backgroundImage="url("+ITSmoreQR+")";
//footerStyle().backgroundImage = "url("+ITSmoreQR+")";

function html_fold(e){
    if( e.innerHTML == "Fold" ){
        e.innerHTML = "Unfold"
        document.getElementById('gsh-menu-exit').innerHTML=""
        document.getElementById('GshStatement').open=false
        GshFeatures.open = false
        document.getElementById('html-src').open=false
        document.getElementById(E_GINDEX).open=false
        document.getElementById(E_GOCODE).open=false
        document.getElementById(E_TODO).open=false
        document.getElementById('references').open=false
    }else{
        e.innerHTML = "Fold"
        document.getElementById('GshStatement').open=true
```

```
        GshFeatures.open = true
        document.getElementById(E_GINDEX).open=true
        document.getElementById(E_GOCODE).open=true
        document.getElementById(E_TODO).open=true
        document.getElementById('references').open=true
    }
}
function html_pure(e){
    if( e.innerHTML == "Pure" ){
        document.getElementById('gsh').style.display=true
        //document.style.display = false
        e.innerHTML = "Unpure"
    }else{
        document.getElementById('gsh').style.display=false
        //document.style.display = true
        e.innerHTML = "Pure"
    }
}

var bannerIsStopping = false
//NOTE: .com/JSREF/prop_style_backgroundposition.asp
function shiftBG(){
    bannerIsStopping = !bannerIsStopping
    bannerStyle.backgroundPosition = "0 0";
}
// status should be inherited on Window Fork(), so use the status in DOM
function html_stop(e,toggle){
    if( toggle ){
        if( e.innerHTML == "Stop" ){
            bannerIsStopping = true
            e.innerHTML = "Start"
        }else{
            bannerIsStopping = false
            e.innerHTML = "Stop"
        }
    }else{
        // update JavaScript variable from DOM status
        if( e.innerHTML == "Stop" ){ // shown if it's running
            bannerIsStopping = false
        }else{
            bannerIsStopping = true
        }
    }
}
html_stop(document.getElementById('GshMenuStop'),false) // onInit.
//html_stop(bannerElem(),false) // onInit.

//https://www.w3schools.com/jsref/met_win_setinterval.asp
var banNshift = 0;
function conslog(str){
    //console.log(str);
}
function shiftBanner(){
    var now = new Date().getTime();
    bpos = ((now/10)%10000).toFixed(0)+'px' + " 0px";
    if( !bannerIsStopping ){
        bannerStyle.backgroundPosition = bpos;
        //GshBanner.style.setProperty('background-position',bpos,'!important');
        banNshift += 1;
        conslog('shiftBanner <'+GshBanner.nodeName+'> '+banNshift
            + ' now='+(now%10)
            //+ ' stop='+bannerIsStopping
            + ' pos='+bpos
            + ' -> '+bannerStyle.backgroundPosition);
    }
}
function Banner_init(){
    console.log('-- Banner Shift init.');
    window.setInterval(shiftBanner,10); // onInit.
}

//  <a href="https://developer.mozilla.org/ja/docs/Web/API/Window/open">window.open()</a>
// from embedded html to standalone page
var MyChildren = 0
function html_fork(){
    ResetPerfMon();
    ResetAffView();
    Reset_ShadingCanvas();
    GJFactory_Destroy()
    MyChildren += 1
    WinId = document.getElementById('gsh-WinId').innerHTML + "." + MyChildren;
    newwin = window.open("",WinId,"");
    src = document.getElementById("gsh");
    srchtml = src.outerHTML
    newwin.document.write("/*<"+"html>\n");
    newwin.document.write(srchtml);
    newwin.document.write("<"+"/html>\n");
    newwin.document.getElementById('gsh-menu-exit').innerHTML = "Close";
    newwin.document.getElementById('gsh-WinId').innerHTML = WinId;
    newwin.document.close();
    newwin.focus();
}
function html_close(){
    window.close()
}
function win_jump(win){
    //win = window.top;
    win = window.opener; // https://developer.mozilla.org/ja/docs/Web/API/window.opener
    if( win == null ){
        console.log("jump to window.opener("+win+")(Error)\n")
    }else{
        console.log("jump to window.opener("+win+")\n")
        win.focus();
    }
}

// 0.2.9 2020-0902 created chekcsum of HTML
CRC32UNIX = 0x04C11DB7 // Unix cksum
function byteCRC32add(bigcrc,octstr,octlen){
    var crc = new Int32Array(1)
    crc[0] = bigcrc

    let oi = 0
    for( ; oi < octlen; oi++ ){
        var oct = new Int8Array(1)
        oct[0] = octstr[oi]
        for( bi = 0; bi < 8; bi++ ){
            //console.log("--CRC32 "+crc[0]+" "+oct[0].toString(16)+" ["+oi+"."+bi+"]\n")
            ovf1 = crc[0] < 0 ? 1 : 0
            ovf2 = oct[0] < 0 ? 1 : 0
            ovf = ovf1 ^ ovf2
            oct[0] <<= 1
            crc[0] <<= 1
            if( ovf ){ crc[0] ^= CRC32UNIX }
        }
    }
    //console.log("--CRC32 byteAdd return crc="+crc[0]+","+oi+"/"+octlen+"\n")
    return crc[0];
}
function strCRC32add(bigcrc,stri,strlen){
    var crc = new Uint32Array(1)
    crc[0] = bigcrc
    var code = new Uint8Array(strlen);
    for( i = 0; i < strlen; i++){
        code[i] = stri.charCodeAt(i) // not charAt() !!!!
        //console.log("=== "+code[i].toString(16)+" <<== "+stri[i]+"\n")
    }
    crc[0] = byteCRC32add(crc,code,strlen)
    //console.log("--CRC32 strAdd return crc="+crc[0]+"\n")
    return crc[0]
}
function byteCRC32end(bigcrc,len){
    var crc = new Uint32Array(1)
    crc[0] = bigcrc
    var slen = new Uint8Array(4)
    let li = 0
        for( ; li < 4; ){
                slen[li] = len
        li += 1
                len >>= 8
                if( len == 0 ){
                        break
        }
        }
        crc[0] = byteCRC32add(crc[0],slen,li)
        crc[0] ^= 0xFFFFFFFF
        return crc[0]
}
function strCRC32(stri,len){
    var crc = new Uint32Array(1)
    crc[0] = 0
    crc[0] = strCRC32add(0,stri,len)
```

```
    crc[0] = byteCRC32end(crc[0],len)
    //console.log("--CRC32 "+crc[0]+" "+len+"\n")
    return crc[0]
}

DestroyGJLink = null; // to be replaced
DestroyFooter = null; // to be defined
DestroyEventSharingCodeview = function dummy(){}
Destroy_WirtualDesktop = function(){}
DestroyNaviButtons = function(){}

function getSourceText(){
    if( DestroyFooter != null ) DestroyFooter();
    version = document.getElementById('GshVersion').innerHTML
    sfavico = document.getElementById('GshFaviconURL').href;
    sbanner = document.getElementById('GshBanner').style.backgroundImage;
    spositi = document.getElementById('GshBanner').style.backgroundPosition;

    if( document.getElementById('GJC_1') != null ){ GJC_1.remove() }
    if( DestroyGJLink != null ) DestroyGJLink();
    DestroyEventSharingCodeview();
    Destroy_WirtualDesktop();
    GshTopbar.innerHTML = "";
    DestroyIndexBar();
    DestroyNaviButtons();
    ResetPerfMon();
    ResetAffView();
    Reset_ShadingCanvas();

    // these should be removed by CSS selector or class, after sevaed to non-printed attribute
    GshBanner.removeAttribute('style');
    document.getElementById('GshMenuSign').removeAttribute("style");
    styleGMenu = GMenu.getAttribute("style")
    GMenu.removeAttribute("style");
    styleGStat = GStat.getAttribute("style")
    GStat.removeAttribute("style");
    styleGTop = GTop.getAttribute("style")
    GTop.removeAttribute("style");
    styleGshGrid = GshGrid.getAttribute("style")
    GshGrid.removeAttribute("style");
    //styleGPos = GPos.getAttribute("style");
    //GPos.removeAttribute("style");
    //GPos.innerHTML = "";
    //styleGLog = GLog.getAttribute("style");
    //GLog.removeAttribute("style");
    //GLog.innerHTML = "";
    styleGShellPlane = GShellPlane.getAttribute("style")
    GShellPlane.removeAttribute("style")
    styleRawTextViewer = RawTextViewer.getAttribute("style")
    RawTextViewer.removeAttribute("style")
    styleRawTextViewerClose = RawTextViewerClose.getAttribute("style")
    RawTextViewerClose.removeAttribute("style")

    GshFaviconURL.href = "";
    if( iselem('ConfigIcon') ) ConfigIcon.src = "";

    //it seems that interHTML and outerHTML generate style="" for these (??)
    //GshBanner.removeAttribute('style');
    //GshFooter.removeAttribute('style');
    //GshMenuSign.removeAttribute('style');
    GshBanner.style=""
    GshMenuSign.style=""

    textarea = document.createElement("textarea")
    srchtml = document.getElementById("gsh").outerHTML;
        //textarea = document.createElement("textarea")
        // 2020-0910 ?? ... this causes inserting style="" to Banner and Footer,
        // with Chromium?/ after reloading from file:///
        textarea.innerHTML = srchtml
    // <a href="https://stackoverflow.com/questions/5796718/html-entity-decode">Thanks</a>
        var rawtext = textarea.value
        //textarea.destroy()
        //rawtext = gsh.textContent // this removes #include <FILENAME> too
        var orgtext = ""
         + "/*<"+'html>\n"  // lost preamble text
         + rawtext
         + "<"+"/html>\n"   // lost trail text
        ;

    tlen = orgtext.length
    //console.log("getSourceText: length="+tlen+"\n")
    document.getElementById('GshFaviconURL').href                = sfavico;

    document.getElementById('GshBanner').style.backgroundImage    = sbanner;
    document.getElementById('GshBanner').style.backgroundPosition = spositi;

    GStat.setAttribute("style",styleGStat)
    GMenu.setAttribute("style",styleGMenu)
    GTop.setAttribute("style",styleGTop)
    //GLog.setAttribute("style",styleGLog)
    //GPos.setAttribute("style",styleGPos)
    GshGrid.setAttribute("style",styleGshGrid)
    GShellPlane.setAttribute("style",styleGShellPlane)
    RawTextViewer.setAttribute("style",styleRawTextViewer)
    RawTextViewerClose.setAttribute("style",styleRawTextViewerClose)
    canontext = orgtext.replace(' style=""','')
    // open="" too
    return canontext
}
function getDigest(){
    var text = ""
    text = getSourceText()
    var digest = ""
    tlen = text.length
    digest = strCRC32(text,tlen) + " " + tlen
    return { text, digest }
}
function html_digest(){
    version = document.getElementById('GshVersion').innerHTML
    let {text, digest} = getDigest()
    alert("cksum: " + digest + " " + version)
}
function charsin(stri,char){
    ln = 0;
    for( i = 0; i < stri.length; i++ ){
        if( stri.charCodeAt(i) == char.charCodeAt(0) )
            ln++;
    }
    return ln;
}

//class digestElement extends HTMLElement { }
//< script>customElements.define('digest',digestElement)< /script>
function showDigest(e){
    result = 'version=' + GshVersion.innerHTML + '\n'
    result += 'lines='   + e.dataset.lines   + '\n'
        + 'length='  + e.dataset.length  + '\n'
        + 'crc32u='  + e.dataset.crc32u  + '\n'
        + 'time='    + e.dataset.time    + '\n';

    alert(result)
}

function html_sign(e){
    if( RawTextViewer.style.zIndex == 1000 ){
        hideRawTextViewer()
        return
    }
    GshTopbar.innerHTML = "";
    ResetPerfMon();
    ResetAffView();
    Reset_ShadingCanvas();
    DestroyIndexBar();
    DestroyNaviButtons();
    DestroyEventSharingCodeview();
    Destroy_WirtualDesktop();
    GJFactory_Destroy()
    if( DestroyGJLink != null ) DestroyGJLink();
    //gsh_digest_.innerHTML = "";
    text = getSourceText() // the original text
    tlen = text.length
    digest = strCRC32(text,tlen)
    //gsh_digest_.innerHTML = digest + " " + tlen
    //text = getSourceText() // the text with its digest
    Lines = charsin(text,'\n')

    name = "gsh"
    sid = name + "-digest"
    d = new Date()
    signedAt = d.getTime()

    sign = '/'+'*<'+'span\n'
```

```
        + ' id="' + sid + '"\n'
        + ' class="_digest_"\n'
        + ' data-target-id="'+name+'"\n'
        + ' data-crc32u="'  + digest    + '"\n'
        + ' data-length="'  + tlen      + '"\n'
        + ' data-lines="'   + Lines     + '"\n'
        + ' data-time="'    + signedAt  + '"\n'
        + ' ><' + '/span>\n*'+'/\n'

    text = sign + text

    txthtml = '<' + 'table id="LineNumbered"><' + 'tr><' + 'td>'
        + '<' + 'textarea cols=5 rows=' + Lines + ' class="LineNumber">'
    for( i = 1; i <= Lines; i++ ){
        txthtml += i.toString() + '\n'
    }
    txthtml += ""
        + '<' + '/textarea>'
        + '<' + '/td><' + 'td>'
        + '<' + 'textarea cols=150 rows=' + Lines + 'spellcheck="false"'
        + ' class="LineNumbered">'
        + text + '<'+'/textarea>'
        + '<' + '/td><' + '/tr><' + '/table>'

    for( i = 1; i <= 30; i++ ){
        txthtml += '<br>\n'
    }
    RawTextViewer.innerHTML = txthtml
    RawTextViewer.spellcheck = false // (spelcheck above seems ineffective)

    btn = e
    e.style.color = "rgba(128,128,255,0.9)";
    y = e.getBoundingClientRect().top.toFixed(0)
    //h = e.getBoundingClientRect().height.toFixed(0)
    RawTextViewer.style.top = Number(y) + 30
    RawTextViewer.style.left = 100;
    RawTextViewer.style.height = window.innerHeight - 20;
    //RawTextViewer.style.Opacity = 1.0;
    //RawTextViewer.style.backgroundColor = "rgba(0,0,0,0.0)";
    RawTextViewer.style.backgroundColor = "rgba(255,255,255,0.8)";
    RawTextViewer.style.zIndex = 1000;
    RawTextViewer.style.display = true;

    if( RawTextViewerClose.style == null ){
        RawTextViewerClose.style = "";
    }
    RawTextViewerClose.style.top = Number(y) + 10
    RawTextViewerClose.style.left = 100;
    RawTextViewerClose.style.zIndex = 1001;

    ScrollToElement(CurElement,RawTextViewerClose)
}
function hideRawTextViewer(){
    RawTextViewer.style.left = 10000;
    RawTextViewer.style.zIndex = -100;
    RawTextViewer.style.Opacity = 0.0;
    RawTextViewer.style = null
    RawTextViewer.innerHTML = "";

    GshMenuSign.style.color = "rgba(255,128,128,1.0)";
    RawTextViewerClose.style.top = 0;
    RawTextViewerClose.style = null
}

// source code viewr
function frame_close(){
    srcframe = document.getElementById("src-frame");
    srcframe.innterHTML = "";
    //srcframe.style.cols = 1;
    srcframe.style.rows = 1;
    srcframe.style.height = 0;
    srcframe.style.display = false;
    src = document.getElementById("SrcTextarea");
    src.innerHML = ""
    //src.cols = 0
    src.rows = 0
    src.display = false
    //alert("--closed--")
}
//<!-- | <span onclick="html_view();">Source</span> -->
//<!-- | <span onclick="frame_close();">SourceClose</span> -->
//<!--| <span>Download</span> -->
function frame_open(){
    GshTopbar.innerHTML = "";
    ResetPerfMon();
    ResetAffView();
    Reset_ShadingCanvas();
    DestroyIndexBar();
    DestroyNaviButtons();
    if( DestroyFooter != null ) DestroyFooter();
    document.getElementById('GshFaviconURL').href = "";
    oldsrc = document.getElementById("GENSRC");
    if( oldsrc != null ){
        //alert("--I--(erasing old text)")
        oldsrc.innterHTML = "";
        return
    }else{
        //alert("--I--(no old text)")
    }
    styleBanner = GshBanner.getAttribute("style")
    GshBanner.removeAttribute("style")
    if( document.getElementById('GJC_1') ){ GJC_1.remove() }

    GshFaviconURL.href = "";
    if( iselem('ConfigIcon') ) ConfigIcon.src = "";
    GStat.removeAttribute('style')
    GshGrid.removeAttribute('style')
    GshMenuSign.removeAttribute('style')
    //GPos.removeAttribute('style')
    //GPos.innerHTML = "";
    //GLog.removeAttribute('style')
    //GLog.innerHTML = "";
    GMenu.removeAttribute('style')
    GTop.removeAttribute('style')
    GShellPlane.removeAttribute('style')
    RawTextViewer.removeAttribute('style')
    RawTextViewerClose.removeAttribute('style')

    if( DestroyGJLink != null ) DestroyGJLink();
    GJFactory_Destroy()
    Destroy_WirtualDesktop();
    DestroyEventSharingCodeview();

    src = document.getElementById("gsh");
    srchtml = src.outerHTML
    srcframe = document.getElementById("src-frame");
    srcframe.innerHTML = ""
     + "<"+"cite id=\"GENSRC\">\n"
     + "<"+"style>\n"
     + "#GENSRC textarea{tab-size:4;}\n"
     + "#GENSRC textarea{-o-tab-size:4;}\n"
     + "#GENSRC textarea{-moz-tab-size:4;}\n"
     + "#GENSRC textarea{spellcheck:false;}\n"
     + "</"+"style>\n"
     + "<"+'textarea id="SrcTextarea" cols=100 rows=20 class="gsh-code" spellcheck="false">'
     + "/*<"+"html>\n"  // lost preamble text
     + srchtml
     + "<"+"/html>\n"   // lost trail text
     + "</"+"textarea>\n"
     + "</"+"cite><!-- GENSRC -->\n";

    //srcframe.style.cols = 80;
    //srcframe.style.rows = 80;

    GshBanner.setAttribute('style',styleBanner)
}
function fill_CSSView(){
    part = document.getElementById('GshStyleDef')
    view = document.getElementById('gsh-style-view')
    view.innerHTML = ""
     + "<"+'textarea cols=100 rows=20 class="gsh-code">'
     + part.innerHTML
     + "<"+"/textarea>"
}
function fill_JavaScriptView(){
    jspart = document.getElementById('gsh-script')
    view = document.getElementById('gsh-script-view')
    view.innerHTML = ""
     + "<"+'textarea cols=100 rows=20 class="gsh-code">'
     + jspart.innerHTML
     + "<"+"/textarea>"
}
```

```
function fill_DataView(){
    part = document.getElementById('gsh-data')
    view = document.getElementById('gsh-data-view')
    view.innerHTML = ""
     + "<"+'textarea cols=100 rows=20 class="gsh-code">'
     + part.innerHTML
     + "<"+"/textarea>"
}
function jumpto_StyleView(){
    jsview = document.getElementById('html-src')
    jsview.open = true
    jsview = document.getElementById('gsh-style-frame')
    jsview.open = true
    fill_CSSView()
}
function jumpto_JavaScriptView(){
    jsview = document.getElementById('html-src')
    jsview.open = true
    jsview = document.getElementById('gsh-script-frame')
    jsview.open = true
    fill_JavaScriptView()
}
function jumpto_DataView(){
    jsview = document.getElementById('html-src')
    jsview.open = true
    jsview = document.getElementById('gsh-data-frame')
    jsview.open = true
    fill_DataView()
}
function jumpto_WholeView(){
    jsview = document.getElementById('html-src')
    jsview.open = true
    jsview = document.getElementById('gsh-whole-view')
    jsview.open = true
    frame_open()
}
function html_view(){
    html_stop();

    banner = document.getElementById('GshBanner').style.backgroundImage;
    footer = document.getElementById('GshFooter').style.backgroundImage;
    document.getElementById('GshBanner').style.backgroundImage = "";
    document.getElementById('GshBanner').style.backgroundPosition = "";
    document.getElementById('GshFooter').style.backgroundImage = "";

    //srcwin = window.open("","CodeView2","");
    srcwin = window.open("","","");
    srcwin.document.write("<span id=\"gsh\">\n");

    src = document.getElementById("gsh");
    srcwin.document.write("<"+"style>\n");
    srcwin.document.write("textarea{tab-size:4;}\n");
    srcwin.document.write("textarea{-o-tab-size:4;}\n");
    srcwin.document.write("textarea{-moz-tab-size:4;}\n");
    srcwin.document.write("</style>\n");
    srcwin.document.write("<h2>\n");
    srcwin.document.write("<"+"span onclick=\"window.close();\">Close</span> | \n");
    //srcwin.document.write("<"+"span onclick=\"html_stop();\">Run</span>\n");
    srcwin.document.write("</h2>\n");
    srcwin.document.write("<"+"textarea id=\"gsh-src-src\" cols=100 rows=60>");
    srcwin.document.write("/*<"+"html>\n");
    srcwin.document.write("<"+"span id=\"gsh\">");
    srcwin.document.write(src.innerHTML);
    srcwin.document.write("<"+"/span><"+"/html>\n");
    srcwin.document.write("</"+"textarea>\n");

    document.getElementById('GshBanner').style.backgroundImage = banner;
    document.getElementById('GshFooter').style.backgroundImage = footer

    sty = document.getElementById("GshStyleDef");
    srcwin.document.write("<"+"style>\n");
    srcwin.document.write(sty.innerHTML);
    srcwin.document.write("<"+"/style>\n");

    run = document.getElementById("gsh-script");
    srcwin.document.write("<"+"script>\n");
    srcwin.document.write(run.innerHTML);
    srcwin.document.write("<"+"/script>\n");

    srcwin.document.write("<"+"/span><"+"/html>\n"); // gsh span
    srcwin.document.close();
    srcwin.focus();
}
GSH = document.getElementById("gsh")

//GSH.onclick = "alert('Ouch!')"
//GSH.css = "{background-color:#eef;}"
//GSH.style = "background-color:#eef;"
//GSH.style.display = false;
//alert('Ouch0!')
//GSH.style.display = true;

// 2020-0904 created, tentative
        //document.addEventListener('keydown',jgshCommand);
//CurElement = GshStatement
CurElement = GshMenu
MemElement = GshMenu

function nextSib(e){
    n = e.nextSibling;
    for( i = 0; i < 100; i++ ){
        if( n == null ){
            break;
        }
        if( n.nodeName == "DETAILS" ){
            return n;
        }
        n = n.nextSibling;
    }
    return null;
}
function prevSib(e){
    n = e.previousSibling;
    for( i = 0; i < 100; i++ ){
        if( n == null ){
            break;
        }
        if( n.nodeName == "DETAILS" ){
            return n;
        }
        n = n.previousSibling;
    }
    return null;
}
function setColor(e,eName,eColor){
    if( e.hasChildNodes() ){
        s = e.childNodes;
        if( s != null ){
            for( ci = 0; ci < s.length; ci++ ){
                if( s[ci].nodeName == eName ){
                    s[ci].style.color = eColor;
                    //s[ci].style.backgroundColor = eColor;
                    break;
                }
            }
        }
    }
}

// https://docs.microsoft.com/en-us/previous-versions//hh781509(v=vs.85)
function showCurElementPosition(ev){
//  if( document.getElementById("GPos") == null ){
//      return;
//  }
//  if( GPos == null ){
//      return;
//  }
    e = CurElement
    y = e.getBoundingClientRect().top.toFixed(0)
    x = e.getBoundingClientRect().left.toFixed(0)

    h = ev + " "
    h += 'y='+y+", "+ 'x='+x+" -- "
    h += "w=" + window.innerWidth + ", h=" + window.innerHeight + " -- "
    //GPos.test = h
    //GPos.innerHTML = h
//  GPos.innerHTML = h
}

function zero2(n){
    if( n < 10 ){
        return '0' + n;
```

```
    }else{
        return n;
    }
}
function DateHourMin(){
    d = new Date();
    //return '%02d:%02d'.sprintf(d.getHours(),d.getMinutes())
    return zero2(d.getHours()) + ":" + zero2(d.getMinutes());
}
function DateShort0(d){
    return  d.getFullYear()
        + '/' + zero2(d.getMonth())
        + '/' + zero2(d.getDate())
        + ' ' + zero2(d.getHours())
        + ':' + zero2(d.getMinutes())
        + ':' + zero2(d.getSeconds())
}
function DateShort(){
    return DateShort0(new Date());
}
function DateLong0(ms){
    d = new Date();
    d.setTime(ms);
    return  DateShort0(d)
        + '.' + d.getMilliseconds()
        + ' ' + d.getTimezoneOffset()/60
        + ' ' + d.getTime()  + '.' + d.getMilliseconds()
}
function DateLong(){
    return DateLong0(new Date());
}
function GShellMenu(e){
    //GLog.innerHTML = "Hello, World! (" + DateLong() + ")"
    //showGShellPlane()
    ConfigClick();
}
// placements of planes
function GShellResizeX(ev){
    //if( document.getElementById("GMenu") != null ){
        //GshInsideIconSetup();
        //GMenu.style.left = window.innerWidth - 100
        //GMenu.style.top = window.innerHeight - 90 - 200
        //console.log("place GMENU "+GMenu.style.left+" "+GMenu.style.top)

    //}
    GStat.style.width = window.innerWidth
    //if( document.getElementById("GPos") != null ){
        //GPos.style.width = window.innerWidth
        //GPos.style.top = window.innerHeight - 30; //GPos.style.height
    //}
    //if( document.getElementById("GLog") != null ){
    //  GLog.style.width = window.innerWidth
        //GLog.innerHTML = ""
    //}
    //if( document.getElementById("GLog") != null ){
        //GLog.innerHTML = "Resize: w=" + window.innerWidth +
        //", h=" + window.innerHeight
    //}
    showCurElementPosition(ev)
}
function GShellResize(){
    GShellResizeX("[RESIZE]")
}
window.onresize = GShellResize
var prevNode = null
var LogMouseMoveOverElement = false;
function GJSH_OnMouseMove(ev){
    if( LogMouseMoveOverElement == false ){
        return;
    }
    x = ev.clientX
    y = ev.clientY
    d = new Date()
    t = d.getTime() / 1000
    if( document.elementFromPoint ){
        e = document.elementFromPoint(x,y)
        if( e != null ){
            if( e == prevNode ){
            }else{
                console.log('Mo~'+t+'('+x+','+y+') '
                    +e.nodeType+' '+e.tagName+'#'+e.id)
                prevNode = e
            }
        }else{
            console.log(t+'('+x+','+y+') no element')
        }
    }else{
        console.log(t+'('+x+','+y+') no elementFromPoint')
    }
}
window.addEventListener('mousemove',GJSH_OnMouseMove);

function GJSH_OnMouseMoveScreen(ev){
    x = ev.screenX
    y = ev.screenY
    d = new Date()
    t = d.getTime() / 1000
    console.log(t+'('+x+','+y+') no elementFromPoint')
}
//screen.addEventListener('mousemove',GJSH_OnMouseMoveScreen);

function ScrollToElement(oe,ne){
    ne.scrollIntoView()
    ny = ne.getBoundingClientRect().top.toFixed(0)
    nx = ne.getBoundingClientRect().left.toFixed(0)
    //GLog.innerHTML = "["+ny+","+nx+"]"
    //window.scrollTo(0,0)

    GTop.style.backgroundColor = "rgba(0,0,0,0.0)"
    GshGrid.style.left = '250px';
    GshGrid.style.zIndex = 0
    if( false ){
        oy = oe.getBoundingClientRect().top.toFixed(0)
        ox = oe.getBoundingClientRect().left.toFixed(0)
        y = e.getBoundingClientRect().top.toFixed(0)
        x = e.getBoundingClientRect().left.toFixed(0)
        window.scrollTo(x,y)
        ny = e.getBoundingClientRect().top.toFixed(0)
        nx = e.getBoundingClientRect().left.toFixed(0)
        //GLog.innerHTML = "["+oy+","+ox+"]->["+y+","+x+"]->["+ny+","+nx+"]"
    }
}
function showGShellPlane(){
    if( GShellPlane.style.zIndex == 0 ){
        GShellPlane.style.zIndex = 1000;
        GShellPlane.style.left = 30;
        GShellPlane.style.height = 320;
        GShellPlane.innerHTML = DateLong() + "<br>" +
            "-- History --<br>" + MyHistory;
    }else{
        GShellPlane.style.zIndex = 0;
        GShellPlane.style.left = 0;
        GShellPlane.style.height = 50;
        GShellPlane.innerHTML = "";
    }
}
var SuppressGJShell = false
function jgshCommand(kevent){
    if( SuppressGJShell ){
        return
    }
    key = kevent
    keycode = key.code
    //GStat.style.width = window.innerWidth
    GStat.style.backgroundColor = "rgba(0,0,0,0.4)"

    console.log("JSGsh-Key:"+keycode+"(^-^)//")
    if( keycode == "Slash" ){
        console.log('('+x+','+y+') ')
        e = document.elementFromPoint(x,y)
        console.log('('+x+','+y+') '+e.nodeType+' '+e.tagName+'#'+e.id)
    }else
    if( keycode == "Digit0" ){ // fold side-bar
        // "Zero page"
        showGShellPlane();
    }else
    if( keycode == "Digit1" ){ // fold side-bar
        primary.style.width = "94%"
        secondary.style.width = "0%"
        secondary.style.opacity = 0
        GStat.innerHTML = "[Single Column View]"
    }else
```

```
    if( keycode == "Digit2" ){ // unfold side-bar
        primary.style.width = "58%"
        secondary.style.width = "36%"
        secondary.style.opacity = 1
        GStat.innerHTML = "[Double Column View]"
    }else
    if( keycode == "KeyU" ){ // fold/unfold all
        html_fold(GshMenuFold);
        location.href = "#"+CurElement.id;
    }else
    if( keycode == "KeyO" || keycode == "ArrowRight" ){ // fold the element
        CurElement.open = !CurElement.open;
    }else
    if( keycode == "ArrowRight" ){ // unfold the element
        CurElement.open = true
    }else
    if( keycode == "ArrowLeft" ){ // unfold the element
        CurElement.open = false
    }else
    if( keycode == "KeyI" ){ // inspect the element
        e = CurElement
        //GLog.innerHTML =
        GJLog_append("Current Element: " + e + "<br>"
            + "name="+e.nodeName + ", "
            + "id="+e.id + ", "
            + "children="+e.childNodes.length + ", "
            + "parent="+e.parentNode.id + "<br>"
            + "text="+e.textContent)
        GStat.style.backgroundColor = "rgba(0,0,0,0.8)"
        return
    }else
    if( keycode == "KeyM" ){ // memory the position
        MemElement = CurElement
    }else
    if( keycode == "KeyN" || keycode == "ArrowDown" ){ // next element
        e = nextSib(CurElement)
        if( e != null ){
            setColor(CurElement,"SUMMARY","#fff")
            setColor(e,"SUMMARY","#8f8") // should be complement ?
            oe = CurElement
            CurElement = e
            //location.href = "#"+e.id;
            ScrollToElement(oe,e)
        }
    }else
    if( keycode == "KeyP" || keycode == "ArrowUp" ){ // previous element
        oe = CurElement
        e = prevSib(CurElement)
        if( e != null ){
            setColor(CurElement,"SUMMARY","#fff")
            setColor(e,"SUMMARY","#8f8") // should be complement ?
            CurElement = e
            //location.href = "#"+e.id;
            ScrollToElement(oe,e)
        }else{
            e = document.getElementById("GshBanner")
            if( e != null ){
                setColor(CurElement,"SUMMARY","#fff")
                CurElement = e
                ScrollToElement(oe,e)
            }else{
                e = document.getElementById("primary")
                if( e != null ){
                    setColor(CurElement,"SUMMARY","#fff")
                    CurElement = e
                    ScrollToElement(oe,e)
                }
            }
        }
    }else
    if( keycode == "KeyR" ){
        location.reload()
    }else
    if( keycode == "KeyJ" ){
        GshGrid.style.top = '120px';
        GshGrid.innerHTML = '(>_<){Down}';
    }else
    if( keycode == "KeyK" ){
        GshGrid.style.top = '0px';
        GshGrid.innerHTML = '(^~^){Up}';
    }else
    if( keycode == "KeyH" ){
        GshGrid.style.left = '0px';
        GshGrid.innerHTML = "('_'){Left}";
    }else
    if( keycode == "KeyL" ){
        //GLog.innerHTML +=
        GJLog_append(
            'screen='+screen.width+'px'+'<br>'+
            'window='+window.innerWidth+'px'+'<br>'
        )
        GshGrid.style.left = (document.documentElement.clientWidth-160).toString(10)+'px';
        GshGrid.innerHTML = '(@_@){Right}';
    }else
    if( keycode == "KeyS" ){
        html_stop(GshMenuStop,true)
    }else
    if( keycode == "KeyF" ){
        html_fork()
    }else
    if( keycode == "KeyC" ){
        window.close()
    }else
    if( keycode == "KeyD" ){
        html_digest()
    }else
    if( keycode == "KeyV" ){
        e = document.getElementById('gsh-digest')
        if( e != null ){
            showDigest(e)
        }
    }

    showCurElementPosition("["+key.code+"] --");
    //if( document.getElementById("GPos") != null ){
        //GPos.innerHTML += "["+key.code+"] --"
    //}
    //GShellResizeX("["+key.code+"] --");
}
var initGSKC = false;
function GShell_initKeyCommands(){
    if( initGSKC ){ return; } initGSKC = true;

    GShellResizeX("[INIT]");
    DisplaySize = '-- Display: '
        + 'screen='+screen.width+'px, '+'window='+window.innerWidth+'px';

    let {text, digest} = getDigest()
    //GLog.innerHTML +=
    GJLog_append(
        '-- GShell: ' + GshVersion.innerHTML + '\n' +
        '-- Digest: ' + digest + '\n' +
        DisplaySize
        //+ "<br>" + "-- LastVisit:<br>" + MyHistory
    )
    GShellResizeX(null);
}
//GShell_initKeyCommands();

// <a href="https://www.w3.org/TR/WebCryptoAPI/">Web Cryptography API</a>
//Convert a string into an ArrayBuffer
//from https://developers.google.com/web/updates/2012/06/How-to-convert-ArrayBuffer-to-and-from-String
function str2ab(str) {
    const buf = new ArrayBuffer(str.length);
    const bufView = new Uint8Array(buf);
    for (let i = 0, strLen = str.length; i < strLen; i++) {
        bufView[i] = str.charCodeAt(i);
    }
    return buf;
}
function importPrivateKey(pem) {
  const binaryDerString = window.atob(pemContents);
  const binaryDer = str2ab(binaryDerString);
  return window.crypto.subtle.importKey(
    "pkcs8",
    binaryDer,
    {
     name: "RSA-PSS",
     modulusLength: 2048,
     publicExponent: new Uint8Array([1, 0, 1]),
     hash: "SHA-256",
    },
```

```
    true,
    ["sign"]
  );
}
//importPrivateKey(ppem)

//key = {}
//buf = "abc"
//enc = "xyzxxxxxx"; //crypto.publicEncrypt(key,buf)
//b64 = btoa(enc)
//dec = atob(b64)
//GLog.innerHTML = "enc:" + b64 + ", dec:" + dec
</script>
*/

/*
<!-- ----- GJConsole BEGIN { ----- -->
<span id="gjc" data-title="GJConsole" data-author="sato@its-more.jp">
<details><summary>GJ Console</summary>
<p>
<span id="GJE_RootNode0"></span>
<span id="GJC1_Container"></span>
</p>
<style id="GJConsoleStyle">
 .GJConsole {
   z-index:1000;
   width:400; height:200px;
   margin:2px;
   color:#fff; background-color:#66a;
   font-size:12px; font-family:monospace,Courier New;
 }
</style>

<script id="GJConsoleScript" class="GJConsole">
  var PS1 = "% "
  function GJC_Keydown(keyevent){
    key = keyevent.code
    if( key == "Enter" ){
        GJC_Command(this)
        this.value += "\n" + PS1 // prompt
    }else
    if( key == "Escape"){
        SuppressGJShell = false
        GshMenu.focus() // should be previous focus
    }
  }
  var GJC_SessionId
  function GJC_SetSessionId(){
    var xd = new Date()
    GJC_SessionId = xd.getTime() / 1000
  }
  GJC_SetSessionId()
  function GJC_Memory(mem,args,text){
    argv = args.split(' ')
    cmd = argv[0]
    argv.shift()
    args = argv.join(' ')
    ret = ""

    if( cmd == 'clear' ){
        Permanent.setItem(mem,'')
    }else
    if( cmd == 'read' ){
        ret = Permanent.getItem(mem)
    }else
    if( cmd == 'save' ){
        val = Permanent.getItem(mem)
        if( val == null ){ val = "" }
        d = new Date()
        val += d.getTime()/1000+" "+GJC_SessionId+" "+document.URL+" "+args+"\n"
        val += text.value
        Permanent.setItem(mem,val)
    }else
    if( cmd == 'write' ){
        val = Permanent.getItem(mem)
        if( val == null ){ val = "" }
        d = new Date()
        val += d.getTime()/1000+" "+GJC_SessionId+" "+document.URL+" "+args+"\n"
        Permanent.setItem(mem,val)
    }else{
        ret = "Commands: write | read | save | clear"
    }
    return ret
  }
  // -- 2020-09-14 added TableEditor
  var GJE_CurElement = null; //GJE_RootNode
  GJE_NodeSaved = null
  GJE_TableNo = 1
  function GJE_StyleKeyCommand(kev){
    keycode = kev.code
    console.log('GJE-Key: '+keycode)
    if( keycode == 'Escape' ){
        GJE_SetStyle(this);
    }
    kev.stopPropagation()
    // https://developer.mozilla.org/en-US/docs/Web/API/Event/stopPropagation
  }
  var GJE_CommandMode = false
  function GJE_TableKeyCommand(kev,tab){
    wasCmdMode = GJE_CommandMode
    key = kev.code
    if( key == 'Escape' ){
        console.log("To command mode: "+tab.nodeName+"#"+tab.id)
        //tab.setAttribute('contenteditable','false')
        tab.style.caretColor = "blue"
        GJE_CommandMode = true
    }else
    if( key == "KeyA" ){
        tab.style.caretColor = "red"
        GJE_CommandMode = false
    }else
    if( key == "KeyI" ){
        tab.style.caretColor = "red"
        GJE_CommandMode = false
    }else
    if( key == "KeyO" ){
        tab.style.caretColor = "red"
        GJE_CommandMode = false
    }else
    if( key == "KeyJ" ){
        console.log("ROW-DOWN")
    }else
    if( key == "KeyK" ){
        console.log("ROW-UP")
    }else
    if( key == "Keyw" ){
        console.log("COL-FORW")
    }else
    if( key == "Keyb" ){
        console.log("COL-BACK")
    }

    kev.stopPropagation()
    if( wasCmdMode ){
        kev.preventDefault()
    }
  }
  function GJE_DragEvent(ev,elem){
    x = ev.clientX
    y = ev.clientY
    console.log("Dragged: "+this.nodeName+'#'+this.id+' x='+x+' y='+y)
  }
  // https://developer.mozilla.org/en-US/docs/Web/API/DragEvent
  // https://www.w3.org/TR/uievents/#events-mouseevents
  function GJE_DropEvent(ev,elem){
    x = ev.clientX
    y = ev.clientY
    this.style.x = x
    this.style.y = y
    this.style.position = 'absolute' // 'fixed'
    this.parentNode = gsh // just for test
    console.log("Dropped: "+this.nodeName+'#'+this.id+' x='+x+' y='+y
        +' parent='+this.parentNode.id)
  }
  function GJE_SetTableStyle(ev){
    this.innerHTML = this.value; // sync. for external representation?
    if(false){
        stid = this.parentNode.id+this.id
            // and remove "_span" at the end
        e = document.getElementById(stid)
        //alert('SetTableStyle #'+e.id+'\n'+this.value)
        if( e != null ){
```

```
8748            e.innerHTML = this.value
8749        }else{
8750            console.log('Style Not found: '+stid)
8751        }
8752        //alert('event StopPropagetion: '+ev)
8753    }
8754  }
8755  function setCSSofClass(cclass,cstyle){
8756    const ss = document.styleSheets[3]; // 0, 1, 2, 3, ... ?
8757    rlen = ss.cssRules.length;
8758    let tabrule = null;
8759    rulex = -1
8760
8761    // should skip white space at the top of cstyle
8762    sel = cstyle.charAt(0);
8763    selector = sel+cclass;
8764    console.log('-- search style rule for '+selector)
8765
8766    for(let i = 0; i < rlen; i++){
8767        cr = ss.cssRules[i];
8768        console.log('CSS rule ['+i+'/'+rlen+'] '+cr.selectorText);
8769        if( cr.selectorText  === selector ){ // css class selector
8770            tabrule = ss.cssRules[i];
8771            console.log('CSS rule found for:['+i+'/'+rlen+'] '+selector);
8772            ss.deleteRule(i);
8773            //rlen = ss.cssRules.length;
8774            rulex = i
8775            // should search and replace the property here
8776        }
8777    }
8778    // https://developer.mozilla.org/en-US/docs/Web/API/CSSStyleSheet/insertRule
8779    if( tabrule == null ){
8780        console.log('CSS rule NOT found for:['+rlen+'] '+selector);
8781        ss.insertRule(cstyle,rlen);
8782        ss.insertRule(cstyle,0); // override by 0?
8783        console.log('CSS rule inserted:['+(rlen+1)+']\n'+cstyle);
8784    }else{
8785        ss.insertRule(cstyle,rlen);
8786        ss.insertRule(cstyle,0);
8787        console.log('CSS rule replaced:['+(rlen+1)+']\n'+cstyle);
8788    }
8789  }
8790  function GJE_SetStyle(te){
8791    console.log('Apply the style to:'+te.id+'\n');
8792    console.log('Apply the style to:'+te.parentNode.id+'\n');
8793    console.log('Apply the style to:'+te.parentNode.class+'\n');
8794    cclass = te.parentNode.class;
8795    setCSSofClass(cclass,te.value); // should get selecter part from
8796                    // selector { rules }
8797
8798    if(false){
8799    //console.log('Apply the style:')
8800    //stid = this.parentNode.id+this.id+"
8801    //stid = this.id+".style"
8802    css = te.value
8803    stid = te.parentNode.id+".style"
8804    e = document.getElementById(stid)
8805    if( e != null ){
8806        //console.log('Apply the style:'+te.id+'\n'+te.value);
8807        console.log('Apply the style:'+te.id+'\n'+css);
8808 //     e.innerHTML = css; //te.value;
8809        //ncss = e.sheet;
8810        //ncss.insertRule(te.value,ncss.cssRules.length);
8811    }else{
8812        console.log('No element to Apply the style: '+stid)
8813    }
8814    tblid = te.parentNode.id+".table";
8815    e = document.getElementById(tblid);
8816    if( e != null ){
8817        //e.setAttribute('style',css);
8818        e.setProperty('style',css,'!impotant');
8819    }
8820    }
8821  }
8822  function makeTable(argv){
8823    //tid = ''
8824        //cwe = GJE_CurElement
8825        cwe = GJC1_Container;
8826        //cwd = GJFactory;
8827    tid = 'table_' + GJE_TableNo
8828
8829    nt = new Text('\n')
8830    cwe.appendChild(nt)
8831
8832    ne = document.createElement('span'); // the container
8833    cwe.appendChild(ne)
8834    ne.id = tid + '-span'
8835    ne.setAttribute('contenteditable',true)
8836
8837    htspan = document.createElement('span'); // html part
8838    //htspan.id = tid + '-html'
8839    //ne.innerHTML = '\n'
8840    nt = new Text('\n')
8841    ne.appendChild(nt)
8842    ne.appendChild(htspan)
8843
8844    htspan.id = tid
8845    htspan.setAttribute('class',tid)
8846
8847    ne.setAttribute('draggable','true')
8848    ne.addEventListener('drag',GJE_DragEvent);
8849    ne.addEventListener('dragend',GJE_DropEvent);
8850
8851    var col = 3
8852    var row = 2
8853    if( argv[0] != null ){
8854        col = argv[0]
8855        argv.shift()
8856    }
8857    if( argv[0] != null ){
8858        row = argv[0]
8859        argv.shift()
8860    }
8861
8862    //ne.setAttribute('class',tid)
8863    ht = "\n"
8864    //ht += '<'+'table ' + 'id="'+tid+'"' + ' class="'+tid+'"'
8865    ht += '<'+'table '
8866        + ' onkeydown="GJE_TableKeyCommand(event,this)"'
8867        //+ ' ondrag="GJE_DragEvent(event,this)"\n'
8868        //+ ' ondragend="GJE_DropEvent(event,this)"\n'
8869        //+ ' draggable="true"\n'
8870        //+ ' contenteditable="true"'
8871        + '>\n'
8872    ht += '<'+'tbody>\n';
8873    for( r = 0; r < row; r++ ){
8874        ht += "<"+"tr>\n"
8875        for( c = 0; c < col; c++ ){
8876            ht += "<"+"td>"
8877            ht +=  "ABCDEFGHIJKLMNOPQRSTUVWXYZ".charAt(c) + r
8878            ht += "<"+"/td>\n"
8879        }
8880        ht += "<"+"/tr>\n"
8881    }
8882    ht += '<'+'/tbody>\n';
8883    ht += '<'+'/table>\n';
8884    htspan.innerHTML = ht;
8885    nt = new Text('\n')
8886    ne.appendChild(nt)
8887
8888    st = '#'+tid+' *{\n' // # for instanse specific
8889        +'  '+'border:1px solid #aaa;\n'
8890        +'  '+'background-color:#efe;\n'
8891        +'  '+'color:#222;\n'
8892        +'  '+'font-size:#14pt !important;\n'
8893        +'  '+'font-family:monospace,Courier New !important;\n'
8894        +'} /'+'* hit ESC to apply *'+'/\n'
8895
8896    // wish script to be incldued
8897    //nj = document.createElement('script')
8898    //ne.appendChild(nj)
8899    //ne.innerHTML = 'function SetStyle(e){}'
8900
8901    // selector seems lost in dynamic style appending
8902    if(false){
8903     ns = document.createElement('style')
8904     ne.appendChild(ns)
8905     ns.id = tid + '.style'
8906     ns.innerHTML = '\n'+st
8907     nt = new Text('\n')
8908     ne.appendChild(nt)
8909    }
```

```
    setCSSofClass(tid,st); // should be in JavaScript script?

    nx = document.createElement('textarea')
    ne.appendChild(nx)
    nx.id = tid + '-style_def'
    nx.setAttribute('class','GJ_StyleEditor')
    nx.spellcheck = false
    nx.cols = 60
    nx.rows = 10
    nx.innerHTML = '\n'+st
    nx.addEventListener('change',GJE_SetTableStyle);
    nx.addEventListener('keydown',GJE_StyleKeyCommand);
    //nx.addEventListener('click',GJE_SetTableStyle);

    nt = new Text('\n')
    cwe.appendChild(nt)

    GJE_TableNo += 1
    return 'created TABLE id="'+tid+'"'
  }
  function GJE_NodeEdit(argv){
    cwe = GJE_CurElement
    cmd = argv[0]
    argv.shift()
    args = argv.join(' ')
    ret = ""

    if( cmd == '.u' || cmd == '.un' || cmd == 'undo' ){
        if( GJE_NodeSaved != null ){
            xn = GJE_RootNode
            GJE_RootNode = GJE_NodeSaved
            GJE_NodeSaved = xn
            ret = '-- did undo'
        }else{
            ret = '-- could not undo'
        }
        return ret
    }
    GJE_NodeSaved = GJE_RootNode.cloneNode()
    if( cmd == '.c' || cmd == '.cd' || cmd == 'cd' ){
        if( argv[0] == null ){
            ne = GJE_RootNode
        }else
        if( argv[0] == '..' ){
            ne = cwe.parentNode
        }else{
            ne = document.getElementById(argv[0])
        }
        if( ne != null ){
            GJE_CurElement = ne
            ret = "-- current node: " + ne.id
        }else{
            ret = "-- not found: " + argv[0]
        }
    }else
    if( cmd == '.mkt' || cmd == '.mktable' ){
        makeTable(argv)
    }else
    if( cmd == '.m' || cmd == '.mk' || cmd == 'mk' ){
        ne = document.createElement(argv[0])
        //ne.id = argv[0]
        ret = "-- created " + ne + " under " + cwe.tagName + "#" + cwe.id
        cwe.appendChild(ne)
        if( cmd == '.m' || cmd == '.mk' ){
            GJE_CurElement = ne
        }
    }else
    if( cmd == '.n' || cmd == '.nm' || cmd == 'nm' ){
        cwe.id = argv[0]
    }else
    if( cmd == '.r' || cmd == '.rm' || cmd == 'rm' ){
    }else
    if( cmd == '.h' || cmd == '.sh' || cmd == 'sh' ){
        s = argv.join(' ')
        cwe.innerHTML = s
    }else
    if( cmd == '.a' || cmd == '.sa' || cmd == 'sa' ){
        cwe.setAttribute(argv[0],argv[1])
    }else
    if( cmd == '.l' ){
    }else
    if( cmd == '.i' || cmd == '.ih' || cmd == 'ih' ){
        ret = cwe.innerHTML
    }else
    if( cmd == '.p' || cmd == '.pw' || cmd == 'pw' ){
        ret = cwe.nodeType + " " + cwe.tagName + " " + cwe.id
        for( we = cwe.parentNode; we != null; ){
            ret += "\n" + " " + we.nodeType + " " + we.tagName + " " + we.id
            we = we.parentNode
        }
    }else
    {
        ret = "Command: mk | rm \n"
        ret += "   pw -- print current node\n"
        ret += "   mk type -- make node with name and type\n"
        ret += "   nm name -- set the id #name of current node\n"
        ret += "   rm name -- remove named node\n"
        ret += "   cd name -- change current node\n"
    }
    //alert(ret)
    return ret
  }
  function GJC_Command(text){
    lines = text.value.split('\n')
    line = lines[lines.length-1]
    argv = line.split(' ')
    text.value += '\n'
    if( argv[0] == '%' ){ argv.shift() }
    args0 = argv.join(' ')
    cmd = argv[0]
    argv.shift()
    args = argv.join(' ')

    if( cmd == 'nolog' ){
        StopConsoleLog = true
    }else
    if( cmd == 'new' ){
        if( argv[0] == 'table' ){
            argv.shift()
            console.log('argv='+argv)
            text.value += makeTable(argv)
        }else
        if( argv[0] == 'console' ){
            text.value += GJ_NewConsole('GJ_Console')
        }else{
            text.value += '-- new { console | table }'
        }
    }else
    if( cmd == 'strip' ){
        //text.value += GJF_StripClass()
    }else
    if( cmd == 'css' ){
    sel = '#table_1'
    if(argv[0]=='0')
    rule1 = sel+'{color:#000 !important; background-color:#fff !important;}';
    else
    rule1 = sel+'{color:#f00 !important; background-color:#eef !important;}';
        document.styleSheets[3].deleteRule(0);
        document.styleSheets[3].insertRule(rule1,0);
        text.value += 'CSS rule added: '+rule1
    }else
    if( cmd == 'print' ){
        e = null;
        if( e == null ){
            e = document.getElementById('GJFactory_0')
        }
        if( e == null ){
            e = document.getElementById('GJFactory_1')
        }
        if( argv[0] != null ){
            id = argv[0]
            if( id  == 'f' ){
                //e = document.getElementById('GJE_RootNode');
            }else{
                e = document.getElementById(id)
            }
            if( e != null ){
                text.value += e.outerHTML
            }else{
                text.value += "Not found: " + id
            }
        }else{
```

```
            text.value += GJE_RootNode.outerHTML
            //text.value += e.innerHTML
        }
    }else
    if( cmd == 'destroy' ){
        text.value += GJFactory_Destroy()
    }else
    if( cmd == 'save' ){
        e = document.getElementById('GJFactory')
        Permanent.setItem('GJFactory-1',e.innerHTML)
        text.value += "-- Saved GJFactory"
    }else
    if( cmd == 'load' ){
        gjf = Permanent.getItem('GJFactory-1')
        e = document.getElementById('GJFactory')
        e.innerHTML = gjf
        // must restore EventListener
        text.value += "-- EventListener was not restored"
    }else
    if( cmd.charAt(0) == '.' ){
        argv0 = args0.split(' ')
        text.value += GJE_NodeEdit(argv0)
    }else
    if( cmd == 'cont' ){
        bannerIsStopping = false
        GshMenuStop.innerHTML = "Stop"
    }else
    if( cmd == 'date' ){
        text.value += DateLong()
    }else
    if( cmd == 'echo' ){
        text.value += args
    }else
    if( cmd == 'fork' ){
        html_fork()
    }else
    if( cmd == 'last' ){
        text.value += MyHistory
        //h = document.createElement("span")
        //h.innerHTML = MyHistory
        //text.value += h.innerHTML
        //tx = MyHistory.replace("\n","")
        //text.value += tx.replace("<"+"br>","\n") + "xxxx<"+"br>yyyy"
    }else
    if( cmd == 'ne' ){
        text.value += GJE_NodeEdit(argv)
    }else
    if( cmd == 'reload' ){
        location.reload()
    }else
    if( cmd == 'mem' ){
        text.value += GJC_Memory('GJC_Storage',args,text)
    }else
    if( cmd == 'stop' ){
        bannerIsStopping = true
        GshMenuStop.innerHTML = "Start"
    }else
    if( cmd == 'who' ){
        text.value += "SessionId="+GJC_SessionId+" "+document.URL
    }else
    if( cmd == 'wall' ){
        text.value += GJC_Memory('GJC_Wall','write',text)
    }else
    {
        text.value += "Commands: help | echo | date | last \n"
                + '          new  | save | load | mem  \n'
                + '          who  | wall | fork | nife'
    }
}

function GJC_Input(){
  if( this.value.endsWith("\n") ){ // remove NL added by textarea
      this.value = this.value.slice(0,this.value.length-1)
  }
}

var GCJ_Id = null
function GJC_Resize(){
  GJC_Id.style.zIndex = 20000
  //GJC_Id.style.width = window.innerWidth - 16
  GJC_Id.style.width = '100%';
  GJC_Id.style.height = 300;
  GJC_Id.style.backgroundColor = "rgba(0,64,16,1.0)" // blackboard color
  GJC_Id.style.color = "rgba(255,255,255,1.0)"
}
function GJC_FocusIn(){
  this.spellcheck = false
  SuppressGJShell = true
  this.onkeydown = GJC_Keydown
  GJC_Resize()
}
function GJC_FocusOut(){
  SuppressGJShell = false
  this.removeEventListener('keydown',GJC_Keydown);
}
window.addEventListener('resize',GJC_Resize);

function GJC_OnStorage(e){
  //alert('Got Message')
  //GJC.value += "\n(((ReceivedMessage)))\n"
}
window.addEventListener('storage',GJC_OnStorage);
//window.addEventListener('storage',()=>{alert('GotMessage')})

function GJC_Setup(gjcId){
  //gjcId.style.width = gsh.getBoundingClientRect().width
  gjcId.style.width = '100%';
  gjcId.value = "GJShell Console // " + GshVersion.innerHTML + "\n"
  //gjcId.value += "Date: " + DateLong() + "\n"
  gjcId.value += PS1
  gjcId.onfocus = GJC_FocusIn
  gjcId.addEventListener('input',GJC_Input);
  gjcId.addEventListener('focusout',GJC_FocusOut);
  GJC_Id = gjcId
}
function GJC_Clear(id){
}
function GJConsole_initConsole(){
    if( document.getElementById("GJC_0") != null ){
      GJC_Setup(GJC_0)
    }else{
      GJC1_Container.innerHTML = '<'
          +'textarea id="GJC_1" class="GJConsole"><'+'/textarea>';
      GJC_Setup(GJC_1)
      factory = document.createElement('span');
      gsh.appendChild(factory)
      GJE_RootNode = factory;
      GJE_CurElement = GJE_RootNode;
    }
}
var initGJCF = false;
function GJConsole_initFactory(){
  if( initGJCF ){ return; } initGJCF = true;
  GShell_initKeyCommands();
  GJConsole_initConsole();
}
//GJConsole_initFactory();
// TODO: focus handling
</script>
<style>
.GJ_StyleEditor {
 font-size:9pt !important;
 font-family:Courier New, monospace !important;
}
</style>

</details>
</span>
<!-- ----- GJConsole END } ----- -->
*/

/*
<span id="BlinderText">
<style id="BlinderTextStyle">
 #GJLinkView {
    xxposition:absolute; z-index:5000;
    position:relative;
    display:block;
    left:8px;
    color:#fff;
    width:800px; height:300px; resize:both;
    margin:0px; padding:4px;
```

```
    background-color:rgba(200,200,200,0.5) !important;
}
.MssgText {
    width:578px !important;
    resize:both !important;
    color:#000 !important;
}
.GjNote {
    font-family:Georgia !important;
    font-size:13pt !important;
    color:#22a !important;
}
.textField  {
    display:inline;
    border:0.5px solid #444;
    border-radius:3px;
    color:#000; background-color:#fff;
    width:106pt; height:18pt;
    margin:2px;
    padding:2px;
    resize:none;
    vertical-align:middle;
    font-size:10pt; font-family:Courier New;
}
.textLabel {
    border:0px solid #000 !important;
    background-color:rgba(0,0,0,0);
}
.textURL {
    width:300pt !important;
    border:0px solid #000 !important;
    background-color:rgba(0,0,0,0);
}
.VisibleText {
}
.BlinderText {
    color:#000; background-color:#eee;
}
.joinButton {
    font-family:Georgia !important;
    font-size:11pt;
    line-height:1.1;
    height:18pt;
    width:50pt;
    padding:3px !important;
    text-align:center !important;
    border-color:#aaa !important;
    border-radius:5px;
    color:#fff; background-color:#4a4 !important;
    vertical-align:middle !important;
}
.SendButton {
    vertical-align:top;
}
.ws0_log {
    font-size:10pt;
    color:#000 !important;
    line-height:1.0;
    background-color:rgba(255,255,255,0.7) !important;
    font-family:Courier New,monospace !important;
    width:99.3%;
    white-space:pre;
}
</style>

<!-- Form autofill test
Location: <input id="xxserv" type="text" value="https://192.168.10.1/boafrm/formLogin" size="80">
<form method="POST" id="xxform" action="https://192.168.10.1/boafrm/formLogin">
dest?     <input id="XDS" name="dest" type="text" size="80" value="/index_contents.html">
-->
<details><summary>Form Auto. Filling</summary>
<style>
.xxinput { width:260pt !important; line-height:1.1 !important; margin:1px;
    display:inline !important; font-size:10pt !important; padding:1px !important;
}
</style>
<span style="font-family:Courier New;color:black;font-size:12pt;" onactive="">
 <form method="POST" id="xxform" action="https://192.168.10.1/" style="white-space:pre;">
 Location: <input id="xxserv" class="xxinput" type="text" value="https://192.168.10.1/" size="80">
 Username: <input id="xxuser" class="xxinput" name="user" type="text" autocomplete="on">
 Password: <input id="xxpass" class="xxinput" name="pass" type="password" autocomplete="on">
 SessionId:<input id="xxssid" class="xxinput" name="SESSION_ID" type="text" size="80">
           <input id="xxsubm" class="xxinput" type="submit" value="Submit"></form>
</span>
<script>
 function XXSetFormAction(){
    xxform.setAttribute('action',xxserv.value);
}
xxform.setAttribute('action',xxserv.value);
xxserv.addEventListener('change',XXSetFormAction);
//xxserv.value = location.href;
</script>
</details>
*/

/*
<details id="BlinderTextClass"><summary>BlinderText</summary>
<span class="gsh-src">
<span id="BlinderTextScript">
// https://w3c.github.io/uievents/#event-type-keydown
//
// 2020-09-21 class BlinderText - textarea element not to be readable
//
// BlinderText attributes
//  bl_plainText - null
//  bl_hideChecksum - [false]
//  bl_showLength - [false]
//  bl_visible - [false]
//  data-bl_config - []
//    - min. length
//    - max. length
//    - acceptable charset in generete text
//
function BlinderChecksum(text){
    plain = text.bl_plainText;
    return strCRC32(plain,plain.length).toFixed(0);
}
function BlinderKeydown(ev){
    pass = ev.target
    if( ev.code == 'Enter' ){
        ev.preventDefault();
    }
    ev.stopPropagation()
}
function BlinderKeyup1(ev){
    blind = ev.target
    if( ev.code == 'Backspace'){
        blind.bl_plainText = blind.bl_plainText.slice(0,blind.bl_plainText.length-1)
    }else
    if( and(ev.code == 'KeyV', ev.ctrlKey) ){
        blind.bl_visible = !blind.bl_visible;
    }else
    if( and(ev.code == 'KeyL', ev.ctrlKey) ){
        blind.bl_showLength = !blind.bl_showLength;
    }else
    if( and(ev.code == 'KeyU', ev.ctrlKey) ){
        blind.bl_plainText = "";
    }else
    if( and(ev.code == 'KeyR', ev.ctrlKey) ){
        checksum = BlinderChecksum(blind);
        blind.bl_plainText = checksum; //.toString(32);
    }else
    if( ev.code == 'Enter' ){
        ev.stopPropagation();
        ev.preventDefault();
        return;
    }else
    if( ev.key.length != 1 ){
        console.log('KeyUp: '+ev.code+'/'+ev.key);
        return;
    }else{
        blind.bl_plainText += ev.key;
    }

    leng = blind.bl_plainText.length;
    //console.log('KeyUp: '+ev.code+'/'+blind.bl_plainText);
    checksum = BlinderChecksum(blind) % 10; // show last one digit only

    visual = '';
    if( !blind.bl_hideCheckSum || blind.bl_showLength ){
        visual += '[';
    }
```

```
    if( !blind.bl_hideCheckSum ){
        visual += '#'+checksum.toString(10);
    }
    if( blind.bl_showLength ){
        visual += '/' + leng;
    }
    if( !blind.bl_hideCheckSum || blind.bl_showLength ){
        visual += '] ';
    }
    if( blind.bl_visible ){
        visual += blind.bl_plainText;
    }else{
        visual += '*'.repeat(leng);
    }
    blind.value = visual;
}
function BlinderKeyup(ev){
    BlinderKeyup1(ev);
    ev.stopPropagation();
}
// https://w3c.github.io/uievents/#keyboardevent
// https://w3c.github.io/uievents/#uievent
// https://dom.spec.whatwg.org/#event
function BlinderTextEvent(){
    ev = event;
    blind = ev.target;
    console.log('Event '+ev.type+'@'+blind.nodeName+'#'+blind.id)
    if( ev.type == 'keyup' ){
        BlinderKeyup(ev);
    }else
    if( ev.type == 'keydown' ){
        BlinderKeydown(ev);
    }else{
        console.log('thru-event '+ev.type+'@'+blind.nodeName+'#'+blind.id)
    }
}
//< textarea hidden id="BlinderTextClassDef" class="textField""
// onkeydown="BlinderTextEvent()" onkeyup="BlinderTextEvent()"
// spellcheck="false"><  /textarea>
//< textarea hidden id="gj_pass1"
//  class="textField BlinderText"
//  placeholder="PassWord1"
//  onkeydown="BlinderTextEvent()"
//  onkeyup="BlinderTextEvent()"
//  spellcheck="false"< /textarea>
function SetupBlinderText(parent,txa,phold){
    if( txa == null ){
        txa = document.createElement('textarea');
        //txa.id = id;
    }
    txa.setAttribute('class','textField BlinderText');
    txa.setAttribute('placeholder',phold);
    txa.setAttribute('onkeydown','BlinderTextEvent()');
    txa.setAttribute('onkeyup','BlinderTextEvent()');
    txa.setAttribute('spellcheck','false');
    //txa.setAttribute('bl_plainText','false');
    txa.bl_plainText = '';
    //parent.appendChild(txa);
}
function DestroyBlinderText(txa){
    txa.removeAttribute('class');
    txa.removeAttribute('placeholder');
    txa.removeAttribute('onkeydown');
    txa.removeAttribute('onkeyup');
    txa.removeAttribute('spellcheck');
    txa.bl_plainText = '';
}
//
// visible textarea like Username
//
function VisibleTextEvent(){
    if( event.code == 'Enter' ){
        if( event.target.NoEnter ){
            event.preventDefault();
        }
    }
    event.stopPropagation();
}
function SetupVisibleText(parent,txa,phold){
    if( false ){
        txa.setAttribute('class','textField VisibleText');
    }else{
        newclass = txa.getAttribute('class');
        if( and(newclass != null, newclass != '') ){
            newclass += ' ';
        }
        newclass += 'VisibleText';
        txa.setAttribute('class',newclass);
    }
    //console.log('SetupVisibleText class='+txa.class);
    txa.setAttribute('placeholder',phold);
    txa.setAttribute('onkeydown','VisibleTextEvent()');
    txa.setAttribute('onkeyup', 'VisibleTextEvent()');
    txa.setAttribute('spellcheck','false');
    cols = txa.getAttribute('cols');
    if( cols != null ){
        txa.style.width = '580px';
        //console.log('VisualText#'+txa.id+' cols='+cols)
    }else{
        //console.log('VisualText#'+txa.id+' NO cols')
    }
    rows = txa.getAttribute('rows');
    if( rows != null ){
        txa.style.height = '30px';
        txa.style.resize = 'both';
        txa.NoEnter = false;
    }else{
        txa.NoEnter = true;
    }
}
function DestroyVisibleText(txa){
    txa.removeAttribute('class');
    txa.removeAttribute('placeholder');
    txa.removeAttribute('onkeydown');
    txa.removeAttribute('onkeyup');
    txa.removeAttribute('spellcheck');
    cols = txa.removeAttribute('cols');
}
</span>
<script>
js = document.getElementById('BlinderTextScript');
eval(js.innerHTML);
//js.outerHTML = ""
</script>

</span><!-- end of class="gsh-src" -->
</details>
</span>
*/

/*
<script id="GJLinkScript">
function gjkey_hash(text){
    return strCRC32(text,text.length) % 0x10000;
}
function gj_addlog(e,msg){
    now = (new Date().getTime() / 1000).toFixed(3);
    tstp = '['+now+'] '
    e.value += tstp + msg;
    e.scrollTop = e.scrollHeight;
}
function gj_addlog_cl(msg){
    ws0_log.value += '(console.log) ' + msg + '\n';
}
var GJ_Channel = null;
var GJ_Log = null;
var gjx; // the global variable
function GJ_Join(){
    target = gj_join;
    if( target.value == 'Leave' ){
        GJ_Channel.close();
        GJ_Channel = null;
        target.value = 'Join';
        return;
    }

    var ws0;
    var ws0_log;

    sav_console_log = console.error
    console.error = gj_addlog_cl
    ws0 = new WebSocket(gj_serv.innerHTML);
```

```
    console.error = sav_console_log

    GJ_Channel = ws0;
    ws0_log = document.getElementById('ws0_log');
    GJ_Log = ws0_log;

    now = (new Date().getTime() / 1000).toFixed(3);
    const wsstats = ["CONNECTING","OPEN","CLOSING","CLOSED"];
    cst = wsstats[ws0.readyState];
    gj_addlog(ws0_log,'stat '+ws0.readyState+'('+cst+') : GJ Linked\n');

    ws0.addEventListener('error', function(event){
        gj_addlog(ws0_log,'stat error : transport error?\n');
    });
    ws0.addEventListener('open', function(event){
        GJLinkView.style.zIndex = 10000;
        //console.log('#'+GJLinkView.id+'.zIndex='+GJLinkView.style.zIndex);
        date1 = new Date().getTime();
        date2 = (date1 / 1000).toFixed(3);
        seed = date1.toString(16);

        // user name and key
        user = document.getElementById('gj_user').value;
        if( user.length == 0 ){
            gj_user.value = 'nemo';
            user = 'nemo';
        }
        key1 = document.getElementById('gj_ukey').bl_plainText;
        ukey = gjkey_hash(seed+user+key1).toString(16);

        // session name and key
        chan = document.getElementById('gj_chan').value;
        if( chan.length == 0 ){
            gj_chan.value = 'main';
            chan = 'main';
        }
        key2 = document.getElementById('gj_ckey').bl_plainText;
        ckey = gjkey_hash(seed+chan+key2).toString(16);

        msg = date2 +' JOIN ' + user + '|' + chan + ' ' + ukey + ':' + ckey;
        gj_addlog(ws0_log,'send '+msg+'\n');
        ws0.send(msg);

        target.value = 'Leave';
        //console.log('['+date2+'] #'+target.id+' '+target.value+'\n');
        //gj_addlog(ws0_log,'label '+target.value+'\n');
    });
    ws0.addEventListener('message', function(event){
        now = (new Date().getTime() / 1000).toFixed(3);
        msg = event.data;
        if( false ){
            gj_addlog(ws0_log,'recv '+msg+'\n');
        }
        argv = msg.split(' ')
        tstamp = argv[0];
        argv.shift();
        if( argv[0] == 'reload' ){
            location.reload()
        }
        gjcmd = argv[0];
        otstamp = '';
        if( gjcmd == 'CAST' ){ // from reflector
            otstamp = argv[0];
            argv.shift(); // original time stamp
            ofrom = argv[0];
            argv.shift(); // original from
        }
        argv.shift(); // command
        from = argv[0];
        argv.shift(); // from|to
        cmd1 = argv[0];
        argv.shift(); // xxxx command

        if( false ){
            gj_addlog(ws0_log,'--'
                +' tstamp='+tstamp
                +',gjcmd='+gjcmd
                +',from='+from
                +',cmd=['+cmd1+']'
                +' '+argv+'\n');
        }
        if( cmd1 == 'auth' ){
            // doing authorization required
        }
        if( cmd1 == 'echo' ){
            now = (new Date().getTime() / 1000).toFixed(3);
            msg = now+' '+'RESP '+argv.join(' ');
            gj_addlog(ws0_log,'send '+msg+'\n');
            ws0.send(msg);
        }
        if( cmd1 == 'eval' ){
            argv.shift();
            js = argv.join(' ');
            ret = eval(js); // <------------ eval()
            gj_addlog(ws0_log,'eval '+js+' = '+ret+'\n');
            now = (new Date().getTime() / 1000).toFixed(3);
            msg = now + ' ' + 'RESP ' + ret;
            ws0.send(msg);
            gj_addlog(ws0_log,'send '+msg+'\n')
        }
        if( cmd1 == 'DRAW' ){
            if( false ){
                gj_addlog(ws0_log,'DRAW '+argv[0]+'\n')
            }
            Pointillism_RemoteDraw(argv[0]);
        }
    });
    ws0.addEventListener('close', function(event){
        if( GJ_Channel == null ){
            gj_addlog(ws0_log,'stat OK : GJ UnLinked\n');
            return;
        }
        GJ_Channel.close();
        GJ_Channel = null;
        target.value = 'Join';
        gj_addlog(ws0_log,'stat error : close : GJ UnLinked unexpectedly\n');
    });
}
function GJ_BcastMessageUserPass(user,chan,msgbody){
    now = (new Date().getTime() / 1000).toFixed(3);
    msg = now +' BCAST '+user+'|'+chan+' '+ msgbody;
    if( false ){
        gj_addlog(GJ_Log,'send '+msg+'\n');
    }
    GJ_Channel.send(msg);
}
function GJ_BcastMessage(msgbody){
    if( GJ_Channel == null ){
        gj_addlog(ws0_log,'stat error : send : GJ not Linked\n');
        return;
    }
    //target = event.target;
    user = document.getElementById('gj_user').value;
    chan = document.getElementById('gj_chan').value;
    GJ_BcastMessageUserPass(user,chan,msgbody);
}
function GJ_SendMessageUserPass(user,chan,msgbody){
    now = (new Date().getTime() / 1000).toFixed(3);
    msg = now +' ISAY '+user+'|'+chan+' '+ msgbody;
    gj_addlog(GJ_Log,'send '+msg+'\n');
    GJ_Channel.send(msg);
}
function GJ_SendMessage(msgbody){
    if( GJ_Channel == null ){
        gj_addlog(ws0_log,'stat error : send : GJ not Linked\n');
        return;
    }
    //target = event.target;
    user = document.getElementById('gj_user').value;
    chan = document.getElementById('gj_chan').value;
    GJ_SendMessageUserPass(user,chan,msgbody);
}
function GJ_Send(){
    msgbody = gj_sendText.value;
    GJ_SendMessage(msgbody);
}
</script>

<!-- ------------------------- GJLINK ----------------- -->
<!--
    - User can subscribe to a channel
    - A channel will be broadcasted
```

```
    - A channel can be a pattern (regular expression)
    - User is like From:(me) and channel is like To: or Recipient:
    - like VIABUS
        - watch message with SENDME, WATCH, CATCH, HEAR, or so
        - routing with path expression or name pattern (with routing with DNS like system)
-->
*/

//<span id="GJLinkGolang">
// <details id="GshWebSocket"><summary>Golang / JavaScript Link</summary>
// <span class="gsh-src"><!-- { -->
// 2020-0920 created
// <a href="https://pkg.go.dev/golang.org/x/net/websocket">WS</a>
// <a href="https://godoc.org/golang.org/x/net/websocket">WS</a>
// INSTALL: go get golang.org/x/net/websocket
// INSTALL: sudo {apt,yum} install git (if git is not instlled yet)
// import "golang.org/x/net/websocket"
const gshws_origin = "http://localhost:9999"
const gshws_server = "localhost:9999"
const gshws_port = 9999
const gshws_path = "gjlink1"
const gshws_url = "ws://"+gshws_server+"/"+gshws_path
const GSHWS_MSGSIZE = (8*1024)
func fmtstring(fmts string, params ...interface{})(string){
    return fmt.Sprintf(fmts,params...)
}
func GSHWS_MARK(what string)(string){
    now := time.Now()
    us := fmtstring("%06d",now.Nanosecond() / 1000)
    mark := ""
    if( !AtConsoleLineTop ){
        mark += "\n"
        AtConsoleLineTop = true
    }
    mark += "["+now.Format(time.Stamp)+"."+us+"] -GJ-" + what + ": "
    return mark
}
func gchk(what string,err error){
    if( err != nil ){
        panic(GSHWS_MARK(what)+err.Error())
    }
}
func glog(what string, fmts string, params ...interface{}){
    fmt.Print(GSHWS_MARK(what))
    fmt.Printf(fmts+"\n",params...)
}

var WSV = []*websocket.Conn{}
func jsend(argv []string){
    if len(argv) <= 1 {
        fmt.Printf("--Ij %v [-m] command arguments\n",argv[0])
        return
    }
    argv = argv[1:]
    if( len(WSV) == 0 ){
        fmt.Printf("--Ej-- No link now\n")
        return
    }
    if( 1 < len(WSV) ){
        fmt.Printf("--Ij-- multiple links (%v)\n",len(WSV))
    }

    multicast := false // should be filtered with regexp
    if( 0 < len(argv) && argv[0] == "-m" ){
        multicast = true
        argv = argv[1:]
    }
    args := strings.Join(argv," ")

        now := time.Now()
        msec := now.UnixNano() / 1000000;
        tstamp := fmtstring("%.3f",float64(msec)/1000.0)
        msg := fmtstring("%v SEND gshell|* %v",tstamp,args)

    if( multicast ){
        for i,ws := range WSV {
            wn,werr := ws.Write([]byte(msg))
            if( werr != nil ){
                fmt.Printf("[%v] wn=%v, werr=%v\n",i,wn,werr)
            }
            glog("SQ",fmtstring("(%v) %v",wn,msg))
        }
    }else{
        i := 0
            ws := WSV[i]
            wn,werr := ws.Write([]byte(msg))
            if( werr != nil ){
                fmt.Printf("[%v] wn=%v, werr=%v\n",i,wn,werr)
            }
            glog("SQ",fmtstring("(%v) %v",wn,msg))
    }
}
func ws_broadcast(msg string)(wn int,werr error){
    for i,ws := range WSV {
        wn,werr = ws.Write([]byte(msg))
        if( werr != nil ){
            fmt.Printf("[%v] wn=%v, werr=%v\n",i,wn,werr)
        }
        glog("SQ",fmtstring("(%v) %v",wn,msg))
    }
    return wn,werr;
}
func serv1(ws *websocket.Conn) {
    WSV = append(WSV,ws)
    //fmt.Print("\n")
    glog("CO","accepted connections[%v]",len(WSV))
    //remoteAddr := ws.RemoteAddr
    //fmt.Printf("-- accepted %v\n",remoteAddr)
    //fmt.Printf("-- accepted %v\n",ws.Config())
    //fmt.Printf("-- accepted %v\n",ws.Config().Header)
    //fmt.Printf("-- accepted %v // %v\n",ws,serv1)

    var reqb = make([]byte,GSHWS_MSGSIZE)
    for {
        rn, rerr := ws.Read(reqb)
        if( rerr != nil || rn < 0 ){
            glog("SQ",fmtstring("(%v,%v)",rn,rerr))
            break
        }
        req := string(reqb[0:rn])
        glog("SQ",fmtstring("(%v) %v",rn,req))

        margv := strings.Split(req," ");
        margv = margv[1:]
        if( 0 < len(margv) ){
            if( margv[0] == "RESP" ){
                // should forward to the destination
                continue;
            }
        }
        now := time.Now()
        msec := now.UnixNano() / 1000000;
        tstamp := fmtstring("%.3f",float64(msec)/1000.0)
        res := fmtstring("%v "+"CAST"+" %v",tstamp,req)

        wn := 0;
        werr := error(nil);
        if( 0 < len(margv) && margv[0] == "BCAST" ){
            wn, werr = ws_broadcast(res);
        }else{
            wn, werr = ws.Write([]byte(res))
        }
        gchk("SE",werr)
        glog("SR",fmtstring("(%v) %v",wn,string(res)))
    }
    glog("SF","WS response finish")

    wsv := []*websocket.Conn{}
    wsx := 0
    for i,v := range WSV {
        if( v != ws ){
            wsx = i
            wsv = append(wsv,v)
        }
    }
    WSV = wsv
    //glog("CO","closed %v",ws)
    glog("CO","closed connection [%v/%v]",wsx+1,len(WSV)+1)
    ws.Close()
}
// url ::= [scheme://]host[:port][/path]
func decomp_URL(url string){
```

```
}
func full_wsURL(){
}
func gj_server(argv []string) {
    gjserv := gshws_url
    gjport := gshws_server
    gjpath := gshws_path
    gjscheme := "ws"

    //cmd := argv[0]
    argv = argv[1:]
    if( 1 <= len(argv) ){
        serv := argv[0]
        if( 0 < strings.Index(serv,"://") ){
            schemev := strings.Split(serv,"://")
            gjscheme = schemev[0]
            serv = schemev[1]
        }
        if( 0 < strings.Index(serv,"/") ){
            pathv := strings.Split(serv,"/")
            serv = pathv[0]
            gjpath = pathv[1]
        }
        servv := strings.Split(serv,":")
        host := "localhost"
        port := 9999
        if( servv[0] != "" ){
            host = servv[0]
        }
        if( len(servv) == 2 ){
            fmt.Sscanf(servv[1],"%d",&port)
        }
        //glog("LC","hostport=%v (%v : %v)",servv,host,port)
        gjport = fmt.Sprintf("%v:%v",host,port)
        gjserv = gjscheme + "://" + gjport + "/" + gjpath
    }
    glog("LS",fmtstring("listening at %v",gjserv))
    http.Handle("/"+gjpath,websocket.Handler(serv1))
    err := error(nil)
    if( gjscheme == "wss" ){
        // https://golang.org/pkg/net/http/#ListenAndServeTLS
        //err = http.ListenAndServeTLS(gjport,nil)
    }else{
        err = http.ListenAndServe(gjport,nil)
    }
    gchk("LE",err)
}

func gj_client(argv []string) {
    glog("CS",fmtstring("connecting to %v",gshws_url))
    ws, err := websocket.Dial(gshws_url,"",gshws_origin)
    gchk("C",err)

    var resb = make([]byte, GSHWS_MSGSIZE)
    for qi := 0; qi < 3; qi++ {
        req := fmtstring("Hello, GShell! (%v)",qi)
        wn, werr := ws.Write([]byte(req))
        glog("QW",fmtstring("(%v) %v",wn,req))
        gchk("QE",werr)
        rn, rerr := ws.Read(resb)
        gchk("RE",rerr)
        glog("RM",fmtstring("(%v) %v",rn,string(resb)))
    }
    glog("CP","WS request finish")
}
//</span><!-- end of class="gsh-src" } -->
//</details></span>

/*
<details id="GJLink_Section"><summary>GJ Link</summary>
<span id="GJLinkView" class="GJLinkView">
 <p>
 <note class="GjNote">Execute command "gsh gj server" on the localhost and push the Join button:</note>
 </p>

 <span id="GJLink_1">
 <div id="GJLink_ServerSet"></div>

 <div>
 <input id="gj_join" type="button" class="joinButton" onclick="GJ_Join()" value="Join">
 <span id="GJLink_Account"></span>
 </div>

 <div>
 <input id="gj_sendButton" type="button" class="joinButton SendButton" onclick="GJ_Send()" value="Send" data-bodyid="gj_sendText">
 <span id="GJLink_SendArea"></span>
 </div>

 <div id="ws0_log_container"></div>
 </span>
</span>

<script>
function setupGJLinkArea(){
    GJLink_ServerSet.innerHTML = '<'+'span id="gj_serv_label"'
        + ' class="textField textLabel">Server: <'+'/span>'
        + '<'+'span id="gj_serv" class="textField textURL" contenteditable><'+'/span>';

    GJLink_Account.innerHTML = '<'+'textarea id="gj_user" class="textField"><'+'/textarea>'
        + '<'+'textarea id="gj_ukey" class="textField"><'+'/textarea>'
        + '<'+'textarea id="gj_chan" class="textField"><'+'/textarea>'
        + '<'+'textarea id="gj_ckey" class="textField"><'+'/textarea>';

    GJLink_SendArea.innerHTML =
    '<'+'textarea id="gj_sendText" class="textField MssgText" cols=60 rows=2><'+'/textarea>';

    ws0_log_container.innerHTML = '<'+'textarea id="ws0_log" class="ws0_log"'
        +' cols=100 rows=10 spellcheck="false"><'+'/textarea>';
}
function clearGJLinkArea(){
    GJLink_ServerSet.innerHTML = "";
    GJLink_Account.innerHTML = "";
    GJLink_SendArea.innerHTML = "";
    ws0_log_container.innerHTML = "";
}
</script>

<script>
function SetupGJLink(){
    setupGJLinkArea();
    SetupVisibleText(GJLink_1,gj_serv,'GJLinkSv');
    SetupVisibleText(GJLink_1,gj_user,'UserName');
    SetupBlinderText(GJLink_1,gj_ukey,'UserKey');
    SetupVisibleText(GJLink_1,gj_chan,'ChannelName');
    SetupBlinderText(GJLink_1,gj_ckey,'ChannelKey');
    SetupVisibleText(GJLink_1,gj_sendText,'Message');
    gj_serv.innerHTML = 'ws://localhost:9999/gjlink1'
}
function GJLink_init(){
    SetupGJLink();
}
function iselem(eid){
    return document.getElementById(eid);
}
function DestroyGJLink1(){
    clearGJLinkArea();
    if( !iselem('gj_user') ){
        return;
    }
    if( gj_serv_label.parentNode != gj_user ){
        return;
    }
    if( iselem('gj_serv_label') ) gj_user.parentNode.removeChild(gj_serv_label);
    if( iselem('gj_serv') ) gj_user.parentNode.removeChild(gj_serv);
    if( iselem('gj_user') ) gj_user.parentNode.removeChild(gj_user);
    if( iselem('gj_ukey') ) gj_ukey.parentNode.removeChild(gj_ukey);
    if( iselem('gj_chan') ) gj_chan.parentNode.removeChild(gj_chan);
    if( iselem('gj_ckey') ) gj_ckey.parentNode.removeChild(gj_ckey);
    if( iselem('gj_sendText') ) gj_sendText.parentNode.removeChild(gj_sendText);
    if( iselem('ws0_log') ) ws0_log.parentNode.removeChild(ws0_log);
}
DestroyGJLink = DestroyGJLink1;
</script>
</details>
*/

/*
<style>
.GJDigest {
    display:none;
}
</style>
```

```
<script id="HtmlCodeview-script">
  function showNodeAsHtmlSourceX(otxa,code,prefix,postfix,sign){
    txa = document.createElement('textarea');
    txa.id = otxa.id;
    txa.setAttribute('class','HtmlCodeviewText');
    otxa.parentNode.replaceChild(txa,otxa);
    txa.setAttribute('spellcheck','false');
    //txa.value = code.innerHTML;
    //txa.innerHTML = code.innerHTML;
    txa.innerHTML = prefix + code.outerHTML + postfix;
    if( sign ){
        text = txa.value;
        tlen = txa.value.length;
        digest = strCRC32(text,tlen) + ' ' + tlen
            + ' ' + code.id + ' (' + DateShort() + ')';
        //alert('digest: '+digest);
        console.log('digest: '+digest);
        txa.innerHTML += '//<'+'span class="GJDigest">'+digest+'<'+'/span>\n';
    }
    txa.style.display = "block";
    txa.style.width = "100%";
    txa.style.height = "300px";
  }
  function showHtmlCodeX(otxa,code,prefix,postfix,sign){
    if( event.target.value == 'ShowCode' ){
        showNodeAsHtmlSourceX(otxa,code,prefix,postfix,sign);
        event.target.value = 'HideCode';
    }else{
        otxa.style.display = "none";
        event.target.value = 'ShowCode';
    }
  }
  function showNodeAsHtmlSource(otxa,code){
    showNodeAsHtmlSourceX(otxa,code,'','');
  }
  function showHtmlCode(otxa,code){
    if( event.target.value == 'ShowCode' ){
        showNodeAsHtmlSource(otxa,code);
        event.target.value = 'HideCode';
    }else{
        otxa.style.display = "none";
        event.target.value = 'ShowCode';
    }
  }
</script>
<style id="HtmlCodeview-style">
  .HtmlCodeviewText {
    font-size:10pt;
    font-family:Courier New;
    white-space:pre;
  }
  .HtmlCodeViewButton {
    padding:2pt !important;
    line-height:1.1 !important;
    border:2px inset #bbb !important;
    font-size:11pt !important;
    font-weight:normal !important;
    font-family:Georgia !important;
    border-radius:3px !important;
    color:#ddd; background-color:#228 !important;
  }
</style>
*/

/*
<details><summary>Live HTML Snapshot</summary>
<span id="LiveHTML">
<!-- ---------- HTML SnapShot: Edit, save and load // 2020-0924 SatoxITS { -->
<div class="GshMenu">
<span class="GshMenu1" onclick="html_edit();">Edit</span>
<span class="GshMenu1" onclick="html_save();">Save</span>
<span class="GshMenu1" onclick="html_load();">Load</span>
<span class="GshMenu1" onclick="html_ver0();">Vers</span>
</div>
<div>
<input class="HtmlCodeViewButton" type="button" value="ShowCode" onclick="showLiveHTMLcode()">
<span id="LiveHTML_Codeview"></span>
</div>
<script id="LiveHtmlScript">
function showLiveHTMLcode(){
    showHtmlCode(LiveHTML_Codeview,LiveHTML);
}
var _editable = false;
var savSuppressGJShell = false;
function ToggleEditMode(){
    _editable = !_editable;
    if( _editable ){
        savSuppressGJShell = SuppressGJShell;
        SuppressGJShell = true;
        gsh.setAttribute('contenteditable','true');
        GshMenuEdit.innerHTML = 'Lock';
        GshMenuEdit.style.color = 'rgba(255,0,0,1)';
        GshMenuEdit.style.backgroundColor = 'rgba(255,255,255,1)';
    }else{
        SuppressGJShell = savSuppressGJShell;
        gsh.setAttribute('contenteditable','false');
        GshMenuEdit.innerHTML = 'Edit';
        GshMenuEdit.style.color = 'rgba(16,160,16,1)';
        GshMenuEdit.style.backgroundColor = 'rgba(255,255,255,1)';
    }
}
function html_edit(){
    ToggleEditMode();
}

// Live HTML (DOM) Snapshot onto browser's localStorage
// 2020-0923 SatoxITS
var htRoot = gsh // -- Element-ID, should be selectable
const snappedHTML = 'SnappedHTML'; // Item-ID of the HTML data in localStogate
                  // -- should be a [map] of URL
                  // -- should be with CSSOM as inline script
const htVersionTag = 'VersionTag'; // VesionTag Eelment-ID in the HTML (in DOM)
function showVersion(note,w,v,u,t){
    w.alert(note+': ' + v + '\n'
        + '-- URL:  ' + u + '\n'
        + '-- Time: ' + t + ' (' + DateLong0(t*1000) + ')'
    );
}
function html_save(){
    u = document.URL;
    t = new Date().getTime() / 1000;
    v = '<'+'span id="'+htVersionTag+'" data-url="'+u+'" data-time="'+t+'">';
    v += '<'+'/span>\n';
    h += v + htRoot.outerHTML;
    localStorage.setItem(snappedHTML,h);
    showVersion("Saved",window,v,u,t);
}
function html_load(){
    h = localStorage.getItem(snappedHTML);
    if( h == null ){
        alert('No snapshot taken yet');
        return;
    }
    w = window.open('','','');
    d = w.document;
    d.write(h);
    w.focus();
    html_ver1("Loaded",w,d);
}
function html_ver1(note,w,d){
    if( (v = d.getElementById(htVersionTag)) != null ){
        h = v.outerHTML;
        u = v.getAttribute('data-url');
        t = v.getAttribute('data-time');
    }else{
        h = 'No version info. in the page';
        u = '';
        t = 0;
    }
    showVersion(note,w,v,u,t);
}
function html_ver0(){
    html_ver1("Version",window,document);
}
</script>
<!-- LiveHTML } -->
</span>
</details>
*/

/*
<details><summary>Event sharing</summary>
```

```
<span id="EventSharingCodeSpan">

<!-- ---------- Event sharing // 2020-0925 SatoxITS { -->

<div id="iftestTemplate" class="iftest" hidden="">
<style> .iftestbody{ color:#f22;font-family:Georgia;font-size:10pt;} </style>
<span id="frameBody" class="iftestbody" onclick="frameClick()"><script>
 function docadd(txt){
   document.body.append(txt);
   window.scrollTo(0,100000);
 }
 function frameClick(){
   xy = '(x='+event.x + ' y='+event.y+')';
   //docadd('Got Click on #'+event.target.id+' '+xy+ '\n');
   docadd('Got Click on #'+Fid.value+', '+xy+ '\n');
   window.scrollTo(0,100000);
   window.parent.postMessage('OnClick: '+xy,'*');
 }
 function frameMousemove(){
   if( false ){
   document.body.append('Mousemove on #'+event.target.id+' '
       + 'x='+event.x + ' y='+event.y + '\n');
   peerWin = window.frames.iframe1;
   document.body.append('Send to peer #'+peerWin+' ' + '\n');
   window.scrollTo(0,100000);
   peerWin.postMessage('Hi!','*');
   }
 }
 function frameKeydown(){
   msg = 'Got Keydown: #'+Fid.value+', ('+event.code+')';
   docadd(msg+'\n');
   window.parent.postMessage(msg,'*');
 }
 function frameOnMessage(){
   docadd('Message ' + event.data + '\n');
   window.scrollTo(0,100000);
 }
 if( document.getElementById('Fid') ){
   frameBody.id = Fid.value;
   h = '';
   h += '<'+'style>*{';
   h += 'font-size:10pt;white-space:pre-wrap;';
   h += 'font-family:Courier New;';
   h += '}<'+'/style>';
   h += 'I am '+Fid.value+'\n';
   document.write(h);
   window.addEventListener('click',frameClick);
   window.addEventListener('keydown',frameKeydown);
   window.addEventListener('message',frameOnMessage);
   window.addEventListener('mousemove',frameMousemove);
   window.parent.postMessage('Hi parent, I am '+Fid.value,'*');
 }
</script></span></div>

<style>.iframeTest{margin:3px;resize:both;width:370px;height:120px;}</style>
<h2>Inter-window communicaiton</h2>
<note>
frame0 >>> frame1 and frame2<br>
frame1 >>> frame0 and frame2<br>
frame2 >>> frame0 and frame1<br>
</note>
<div id="iframe-test">
<pre id="iframeHost" style="border:1px;font-family:Courier New;font-size:10pt;"></pre>
<iframe id="iframe0" title="iframe0" class="iframeTest" style=""></iframe>
<iframe id="iframe1" title="iframe1" class="iframeTest"></iframe>
<iframe id="iframe2" title="iframe2" class="iframeTest"></iframe>
</div>

<script id="if0-test-script">
 function InterFrameComm_init(){
   setupFrames0();
   setupFrames12();
 }
 function setFrameSrcdoc(dst,src){
   if( true ){
       dst.contentWindow.document.write(src);
       // this makes browser waite close, and crash if accumulated !?
       // so it should be closed after write
       dst.contentWindow.document.close();
   }else{
       // to be erased before source dump
       // but shold be set for live snapshot
       dst.srcdoc = src;
   }
 }
 function setupFrames0(){
   ibody = iframe0.contentWindow.document.body;
   iframe0.style.width = "755px"
   //iframeHost.innerHTML = "Message exchange at iframes' host:\n";
   window.addEventListener('message',messageFromChild);

   if0 = '';
   if0 += '<'+'pre style="font-family:Courier New;">';
   if0 += '<input id="Fid" value="iframe0">';
   if0 += iftestTemplate.innerHTML;
   setFrameSrcdoc(iframe0,if0);

   function clickOnChild(){
       console.log('clickOn #'+this.id);
   }
   function moveOnChild(){
       console.log('moveOn #'+this.id);
   }
   iframe0.contentWindow.document.body.style.setProperty('white-space','pre');
   iframe0.contentWindow.document.body.style.setProperty('font-size','9pt');
 }
 function setupFrames12(){
   if1 = '<input id="Fid" value="iframe1">';
   if1 += iftestTemplate.innerHTML;
   setFrameSrcdoc(iframe1,if1);
   //iframe1.name = 'iframe1'; // this seems break contentWindow

   if2 = '<input id="Fid" value="iframe2">';
   if2 += iftestTemplate.innerHTML;
   setFrameSrcdoc(iframe2,if2);

   iframe1.addEventListener('message',messageFromChild);
       //iframe1.addEventListener('mouseover',moveOnChild);
   iframe2.addEventListener('message',messageFromChild);
       //iframe2.addEventListener('mouseover',moveOnChild);
   iframe1.contentWindow.postMessage('[parent0] Hi iframe1 -- from parent.','*');
   //iframe1.contentWindow.postMessage('Your peer is '+iframe2.contentWindow,'*');
   iframe2.contentWindow.postMessage('[parent0] Hi iframe2 -- from parent.','*');
   //iframe2.contentWindow.postMessage('Your peer is '+iframe1.contentWindow,'*');
 }
 function messageFromChild(){
   from = null;
   forw = null;
   if( event.source == iframe0.contentWindow ){
       from = '[iframe0] '
       forw = 'iframe12';
   }else
   if( event.source == iframe1.contentWindow ){
       from = '[iframe1] '
       forw = 'iframe2';
   }else
   if( event.source == iframe2.contentWindow ){
       from = '[iframe2] '
       forw = 'iframe1';
   }else
   {
       iframeHost.innerHTML += 'Message [unknown] '
       + ' orig=' + event.origin
       + ' data=' + event.data
       //+ ' from=' + event.source
       ;
   }
   msglog1 = from + event.data + ' -- '
       + ' from=' + event.source
       + ' orig=' + event.origin
       + ' name=' + event.source.name
       //+ ' port=' + event.ports
       //+ ' evid=' + event.lastEventId
       + '\n'
       ;
   if( true ){
       if( forw == 'iframe1' || forw == 'iframe12' ){
       iframe1.contentWindow.postMessage(from+event.data);
       }
       if( forw == 'iframe2' || forw == 'iframe12' ){
       iframe2.contentWindow.postMessage(from+event.data);
       }
```

```
    }
    txtadd0(msglog1);

    function txtadd0(txt){
        iframe0.contentWindow.document.body.append(txt);
        iframe0.contentWindow.scrollTo(0,100000);
    }
  }
  function es_ShowSelf(){
    iframe1.setAttribute('src',document.URL);
    iframe2.setAttribute('src',document.URL);
  }
</script>

<input class="HtmlCodeViewButton" type="button" value="ShowSelf" onclick="es_ShowSelf()">
<input class="HtmlCodeViewButton" type="button" value="ShowCode" onclick="es_showHtmlCode()">
<span id="EventSharingCodeview"></span>
<script id="EventShareingScript">
function es_showHtmlCode(){
    showHtmlCode(EventSharingCodeview,EventSharingCodeSpan);
}
DestroyEventSharingCodeview = function(){
    //EventSharingCodeview.parentNode.removeChild(EventSharingCodeview);
    EventSharingCodeview.innerHTML = "";
    iframe0.style = "";
    //iframe0.srcdoc = "erased";
    //iframe1.srcdoc = "erased";
    //iframe2.srcdoc = "erased";
}
</script>
<!-- EventSharing } -->
</span>
</details>
*/

/*
<!-- ---------- "GShell Inside" Nofitifaction { -->
<script id="script-gshell-inside">
var notices = 0;
function noticeGShellInside(){
    ver = '';
    if( ver = document.getElementById('GshVersion') ){
        ver = ver.innerHTML;
    }
    console.log('GJShell Inside (^-^)//'+ver);
    notices += 1;
    if( 2 <= notices ){
        document.removeEventListener('mousemove',noticeGShellInside);
    }
}
document.addEventListener('mousemove',noticeGShellInside);
noticeGShellInside();

const FooterName = 'GshFooter'
function DestroyFooter(){
    if( (footer = document.getElementById(FooterName)) != null ){
        //footer.parentNode.removeChild(footer);
        empty = document.createElement('div');
        empty.id = 'GshFooter0';
        footer.parentNode.replaceChild(empty,footer);
    }
}
function showFooter(){
    footer = document.createElement('div');
    footer.id = FooterName;
    footer.style.backgroundImage = "url("+ITSmoreQR+")";
    //GshFooter0.parentNode.appendChild(footer);
    GshFooter0.parentNode.replaceChild(footer,GshFooter0);
}
</script>
<!-- } -->

<!--
    border:20px inset #888;
-->

//<span id="WirtualDesktopCodeSpan">
/*
<details id="WirtualDesktopDetails"><summary>Wirtual Desktop</summary>
<!-- ---------- Web Wirtual Desktop // 2020-0927 SatoxITS { -->
<style>
.WirtualSpace {
    z-index:0;
    xwidth:1280px !important; xheight:720px !important;
    width:5120px; height:2880px;
    border-width:0px;
    xxbackground-color:rgba(32,32,160,0.8);
    xxbackground-image:url("WD-WallPaper03.png");
    xxbackground-size:100% 100%;
    color:#22a;xfont-family:Georgia;font-size:10pt;
    xxoverflow:scroll;
}
.WirtualGrid {
    z-index:0;
    position:absolute;
    width:800px; height:500px;
    border:1px inset #fff;
    color:rgba(192,255,192,0.8);
    font-family:Georgia, Courier New;
    text-align:right;
    vertical-align:middle;
    font-size:200px;
    text-shadow:4px 4px #ccf;
}
.WD_GridScroll {
    z-index:100000;
    background-color:rgba(200,200,200,0.1);
}
.WirtualDesktop {
    z-index:0;
    position:relative;
    resize:both !important;
    overflow:scroll;
    display:block;
    min-width:120px !important; min-height:60px !important;
    width:800px;
    height:500px;
    border:10px inset #228;
    border-width:30px; border-radius:20px;
    background-image:url("WD-WallPaper03.png");
    background-size:100% 100%;
    color:#22a;font-family:Georgia;font-size:10pt;
}
.comment {
    // overflow=scroll seems to bound childrens' view in the element span
    // specifying overflow seems fix the position of the element
}
.WirtualBrowserSpan {
    z-index:10;
    xxxborder:0.5px dashed #fff !important;
    border-color:rgba(255,255,255,0.5) !important;
    position:relative;
    left:100px;
    top:100px;
    display:block;
    resize:both !important;
    width:540px;
    height:320px;
    min-width:40px !important; min-height:20px !important;
    max-width:5120px !important; max-height:2880px !important;
    background-color:rgba(255,200,255,0.1);
    xoverflow:scroll;
}
.xWirtualBrowserLocationBar:focus {
    color:#f00;
    background-color:rgba(255,128,128,0.2);
}
.xWirtualBrowserLocationBar:active {
    color:#f00;
    background-color:rgba(128,255,128,0.2);
}
a.WirtualBrowserLocation {
    color:#ccc !important;
    text-decoration:none !important;
}
a.WirtualBrowserLocation:hover {
    color:#fff !important;
    text-decoration:underline;
}
.WirtualBrowserLocationBar {
    position:absolute;
    z-index:100000;
```

```
    display:block;
    width:400px;
    height:20px;
    padding-left:2px;
    line-height:1.1;
    vertical-align:middle;
    font-size:14px;
    color:#fff;
    background-color:rgba(128,128,128,0.2);
    font-family:Georgia;
}
.WirtualBrowserCommandBar {
    position:absolute;
    z-index:200000;
    xxxdisplay:inline;
    display:block;
    width:60px;
    height:20px;
    line-height:1.1;
    vertical-align:middle;
    font-size:14px;
    color:#fe4;
    background-color:rgba(128,128,128,0.1);
    font-family:Georgia;
    text-align:left;
    left:404px;
}
.WirtualBrowserFrame {
    xxposition:relative;
    position:absolute;
    xxdisplay:inline;
    display:block;
    z-index:10;
    resize:both !important;
    width:480px; height:240px;
    min-width:60px; min-height:30px;
    max-width:5120px; max-height:2880px;
    border-radius:6px;
    background-color:rgba(255,255,255,0.9);
    border-top:20px solid;
    border-right:4px solid;
    border-bottom:10px solid;
}
.WinFavicon {
    width:16px;
    height:16px;
    margin:1px;
    margin-right:3px;
    vertical-align:middle;
    background-color:rgba(255,255,255,1.0);
}
.WirtualDesktopMenuBar {
    xposition:absolute;
    color:#fff;
    font-size:7pt;
    text-align:right;
    padding-right:4px;
    background-color:rgba(128,128,128,0.7);
}
.WirtualDesktopCalender {
    color:#fff;
    font-size:22pt;
    text-align:right;
    padding-right:4px;
    xbackground-color:rgba(255,255,255,0.2);
}
.xxxxinput { width:260pt !important; line-height:1.1 !important; margin:1px;
    display:inline !important; font-size:10pt !important; padding:1px !important;
}
.WD_Config {
    display:inline !important;
    padding:2px !important;
    font-size:10pt !important;
    width:60pt !important;
    height:12pt !important;
    line-height:1.0pt !important;
    height:15pt !important;
}
.WD_Button {
    display:inline !important;
    padding:2px !important;
    color:#fff !important;
    background-color:#228 !important;
    font-size:10pt !important;
    width:60pt !important;
    height:12pt !important;
    line-height:1.0pt !important;
    height:16pt !important;
    border:2px inset #44a !important;
}
.WD_Href {
    display:inline !important;
    padding:2px !important;
    font-size:9pt !important;
    width:120pt !important;
    height:12pt !important;
    line-height:1.0pt !important;
    height:15pt !important;
}

.LiveHtmlCodeviewText {
    font-size:10pt;
    font-family:Courier New;
    xwhite-space:pre;
}

.WD_Panel {
    x-index:100 !important;
    color:#000 !important;
    margin-left:25px !important;
    width:800px !important;
    padding:4px !important;
    border:1px solid #888 !important;
    border-radius:6px !important;
    background-color:rgba(220,220,220,0.9) !important;
    font-size:9pt;
    font-family:Courier New;
}
.WD_Help {
    font-size:10pt !important;
    font-family:Courier New;
    line-height:1.2 !important;
    color:#000 !important;
    width:100% !important;
    background-color:rgba(240,240,255,0.8) !important;
}

.WB_Zoom {
}
</style>
<h2>CosmoScreen 0.0.8</h2>
<menu>
<span id="WD_Help_1" class="WD_Help"><b>ScopeControl command keys</b><br>
g ... grid on/off<br>
i ... zoom in<br>
o ... zoom out<br>
s ... save current scope<br>
r ... restore saved scope<br>
</span>
</menu>
<div class="WD_Panel" draggable="true">
<p><!-- should be on the frame of the WD -->
Monitor <input id="WD_Resize_1" class="WD_Button" type="button" value="Resize">
< <input id="WD_Width_1" class="WD_Config" type="text">
x <input id="WD_Height_1" class="WD_Config" type="text">
wall-paper: <a href="WD-WallPaper03.png" class="WD_Href" contenteditable="true">WD-WallPaler03.png</a>
</p>
<p>
Desktop <input id="WS_Resize_1" class="WD_Button" type="button" value="Resize">
< <input id="WS_1_Width" class="WD_Config" type="text">
x <input id="WS_1_Height" class="WD_Config" type="text">
</p>
<p>
Display <input id="WD_Zoom_1" class="WD_Button" type="button" value="Zoom">
< <input id="WD_Zoom_1_XY" class="WD_Config" type="text" value="1.0">
x <input id="WD_Zoom_1_MAG" class="WD_Config" type="text" value="1.41421356">
< <input id="WD_Zoom_1_OUT" class="WD_Button" type="button" value="ZoomOut">
< <input id="WD_Zoom_1_IN" class="WD_Button" type="button" value="ZoomIn">
</p>
<p>
Content <input id="WD_Scroll_1" class="WD_Button" type="button" value="Scroll">
X <input id="WD_Left_1" class="WD_Config" type="text" value="0">
```

```
Y <input id="WD_Top_1" class="WD_Config" type="text" value="0">
shift+wheel for horizontal scroll
</p>
<p>
Scopexx <input id="WD_Zoom_1_Restore" class="WD_Button" type="button" value="Restore">
 < <input id="WD_Zoom_1_RestoreScope" class="WD_Config" type="text" value="Scope0">
 | <input id="WD_Zoom_1_Save" class="WD_Button" type="button" value="Save">
 > <input id="WD_Zoom_1_SaveScope" class="WD_Config" type="text" value="Scope0">
</p>
<p>
Scopeyy <input id="WD_Zoom_1_Forw" class="WD_Button" type="button" value="Forw">
 < <input id="WD_Zoom_1_ForwScope" class="WD_Config" type="text" value="Scope0">
 | <input id="WD_Zoom_1_Back" class="WD_Button" type="button" value="Back">
 > <input id="WD_Zoom_1_BackScope" class="WD_Config" type="text" value="Scope0">
</p>
<p>
Scopezz <input id="WD_Zoom_1_Push" class="WD_Button" type="button" value="Push">
 < <input id="WD_Zoom_1_PushScope" class="WD_Config" type="text" value="Scope0">
 | <input id="WD_Zoom_1_Pop" class="WD_Button" type="button" value="Pop">
 > <input id="WD_Zoom_1_PopScope" class="WD_Config" type="text" value="Scope0">
</p>
<p>
Display <input id="WD_Grid_1" class="WD_Button" type="button" value="GridOn">
</p>
<p>
Overflo <input id="WD_Overflow_1" class="WD_Button" type="button" value="scroll">
"scroll" imprisons windows inside the display
</p>
</div>

<div id="WirtualDesktop_1" class="WirtualDesktop" draggable="true" style="" contenteditable="true">
<div id="WirtualDesktop_1_MenuBar" class="WirtualDesktopMenuBar" spellcheck="false">
<i>CosmoScreen 0.0.8</i><span id="WirtualDesktop_1_Clock"></span>
</div>
<div id="WirtualDesktop_1_Calender" class="WirtualDesktopCalender ">00:00</div>
<div align="right"><h1>WirtualSpace 1.</h1></div>
<div id="WirtualDesktop_1_Content" class="WirtualSpace">

<div id="WirtualBrowser_1" class="WirtualBrowserSpan" spellcheck="false" draggable="true">
<div id="WirtualBrowser_1_Location" class="WirtualBrowserLocationBar"></div>
<span id="WirtualBrowser_1_Command" class="WirtualBrowserCommandBar">Reload</span>
<iframe id="WirtualBrowser_1_Frame" class="WirtualBrowserFrame" style=""></iframe>
</div>

<div id="WirtualBrowser_2" class="WirtualBrowserSpan" spellcheck="false" draggable="true">
<div id="WirtualBrowser_2_Location" class="WirtualBrowserLocationBar"></div>
<span id="WirtualBrowser_2_Command" class="WirtualBrowserCommandBar">Reload</span>
<iframe id="WirtualBrowser_2_Frame" class="WirtualBrowserFrame" style=""></iframe>
</div>

<div id="WirtualBrowser_3" class="WirtualBrowserSpan" spellcheck="false" draggable="true">
<div id="WirtualBrowser_3_Location" class="WirtualBrowserLocationBar"></div>
<span id="WirtualBrowser_3_Command" class="WirtualBrowserCommandBar">Reload</span>
<iframe id="WirtualBrowser_3_Frame" class="WirtualBrowserFrame" style=""></iframe>
</div>

<div id="WirtualDesktop_1_GridPlane" class="WirtualSpace"></div>
</div>
</div>

<input class="HtmlCodeViewButton" type="button" value="ShowCode" onclick="vd_showHtmlCode()">
<span id="WirtualDesktopCodeview"></span>
<script id="WirtualDesktopScript">
function vd_showHtmlCode(){
    codespan = document.getElementById('WirtualDesktopCodeSpan');
    showHtmlCode(WirtualDesktopCodeview,codespan);
    WirtualDesktopCodeview.setAttribute('class','LiveHtmlCodeviewText');
}
DestroyEventSharingCodeview = function(){
    WirtualDesktopCodeview.innerHTML = "";
}

function wdlog(log){
    if( GJ_Channel != null ){
        GJ_SendMessage('WD '+log);
    }
    console.log(log);
}
var topMostWin = 10000;
function onEnterWin(e){
    t = e.target;
    oindex = t.style.zIndex;
    //if( oindex == '' ) oindex = 0;
    //t.saved_zIndex = oindex;
    //t.style.zIndex = 10000;
    topMostWin += 1;
    t.style.zIndex = topMostWin;
    nindex = t.style.zIndex;
    wdlog('Enter '+t+' #'+t.id+'('+oindex+'->'+nindex+')');
    e.stopPropagation();
    e.preventDefault();
}
function onClickWin(e){ // can detect click on the thick border?  t = e.target;
    oindex = t.style.zIndex;
    topMostWin += 1;
    t.style.zIndex = topMostWin;
    nindex = t.style.zIndex;
    wdlog('Click '+t+' #'+t.id+'('+oindex+'->'+nindex+')');
    //e.stopPropagation();
    //e.preventDefault();
}
function onLeaveWin(e){
    t = e.target;
    //oindex = t.style.zIndex;
    //nindex = t.saved_zIndex;
    //t.style.zIndex = nindex;
    //wdlog('Leave '+e.target+' #'+e.target.id+'('+oindex+'->'+nindex+')');
    e.stopPropagation();
    e.preventDefault();
}

var WinDragstartX; // event
var WinDragstartY;
var WinDragstartTX; // target
var WinDragstartTY;

function onWinDragstart(e){
    WinDragstartX = e.x;
    WinDragstartY = e.y;

    t = e.target;

    //WinDragstartTX = t.getBoundingClientRect().left.toFixed(0)
    //WinDragstartTY = t.getBoundingClientRect().top.toFixed(0)
    if( t.style.left == '' ){
        WinDragstartTX = x0 = 0;
        t.style.left = '0px';
    }else{
        //WinDragstartTX = x0 = Number(t.style.left);
        WinDragstartTX = x0 = parseInt(t.style.left);
    }
    if( t.style.top == '' ){
        WinDragstartTY = y0 = 0;
        t.style.top = '0px';
    }else{
        //WinDragstartTY = y0 = Number(t.style.top);
        WinDragstartTY = y0 = parseInt(t.style.top);
    }
    if( true ){ // to be undo
        t.wasAtX = WinDragstartTX;
        t.wasAtY = WinDragstartTY;
    }
    wdlog('DragSTA #'+t.id
        + ' event('+e.x+','+e.y+')'
        + ' position=' + t.style.position
        + ' style left,top('+t.style.left+','+t.style.top+')'
    );
    e.stopPropagation();
    //e.preventDefault();
    return true;
}
function onWinDragEvent(wh,e,set,dolog){
    t = e.target;
    dx = e.x - WinDragstartX;
    dy = e.y - WinDragstartY;
    nx = WinDragstartTX + dx;
    ny = WinDragstartTY + dy;
    log = 'Drag'+wh+' #'+t.id
        + ' event0('+WinDragstartX+','+WinDragstartY+')'
        + ' event('+e.x+','+e.y+')'
        + ' diff('+dx+','+dy+')'
        + ' (' + nx + ',' + ny + ')'
```

```
        + ' (' + t.style.left + ',' + t.style.top + ')'
        + ' wasAt(' + t.wasAtX + ',' + t.wasAtY + ')'
    ;
    if( e.x != 0 || e.y != 0 ){
        if( set == true ){
            //t.style.x = nx + 'px'; // not effective
            //t.style.y = ny + 'px'; // not effective
            t.style.left = nx + 'px';
            t.style.top  = ny + 'px';
            log += ' Set';
        }else{
            log += ' NotSet';
            if( !dolog ){
                log = '';
            }
        }
    }else{
        log += ' What?'; // the type is event start?
        if( !dolog ){
            log = '';
        }
    }
    if( and(dolog, log != '') ){
        wdlog(log);
    }
    if( true ){
        // should be propargeted to parent in FireFox ?
        e.stopPropagation();
    }
    e.preventDefault();
    return false;
}
function onWinDrag(e){
    return onWinDragEvent('Ing',e,true,false);
}
function onWinDragend(e){
    return onWinDragEvent('End',e,false,true);
}
function onWinDragexit(e){
    return onWinDragEvent('Exit',e,false,true);
}
function onWinDragover(e){
    return onWinDragEvent('Over',e,false,true);
}
function onWinDragenter(e){
    return onWinDragEvent('Enter',e,false,true);
}
function onWinDragleave(e){
    return onWinDragEvent('Leave',e,false,true);
}
function onWinDragdrop(e){
    return onWinDragEvent('Drop',e,false,true);
}
function onFaviconChange(e){
    wdlog('--Favicon #'+e.target.id+' href='+e.details.href);
}
var savedSuppressGJShell = false;
function stopGShell(e){
    //wdlog('enter Gsh STOP');
    savedSuppressGJShell = SuppressGJShell;
    SuppressGJShell = true;
    e.stopPropagation();
    e.preventDefault();
}
function contGShell(e){
    //wdlog('leave Gsh STOP');
    SuppressGJShell = savedSuppressGJShell;
    e.stopPropagation();
    e.preventDefault();
}

function WD_onKeydown(e){
    keycode = e.code;
    console.log('Keydown #'+e.target.id+' '+keycode);
    if( keycode == 'KeyG' ){
        WD_setGrid1(WD_Grid_1);
    }else
    if( keycode == 'KeyI' ){
        WD_doZoomIN();
    }else
    if( keycode == 'KeyO' ){
        WD_doZoomOUT();
    }else
    if( keycode == 'KeyR' ){
        WD_RestoreScope(null);
    }else
    if( keycode == 'KeyS' ){
        WD_SaveScope(null);
    }
    e.stopPropagation();
    e.preventDefault();
}
function WD_onKeyup(e){
    e.stopPropagation();
    e.preventDefault();
}
function WD_EventSetup1(){
    WirtualDesktop_1.addEventListener('keydown',    e => { WD_onKeydown(e); });
    WirtualDesktop_1_Content.addEventListener('keydown',    e => { WD_onKeydown(e); });
    WD_Help_1.addEventListener('keydown',   e => { WD_onKeydown(e); });
    WD_Help_1.addEventListener('keyup', e => { WD_onKeyup(e); });
}
function settleWin(s,l,cmd,f,u,w,h,x,y,c,scale){
    function WirtualBrowserCommand(e,s,l,cmd,f){
        command = cmd.innerHTML
        if( command == "Reload" ){
            href_id = e.target.href_id;
            d = document.getElementById(href_id);
            wdlog('href_tag=#'+href_id+'\n elem=#'+href_id+'\n href='+d);
            url = d.innerHTML;
            wdlog('---- Load href_tag=#'+href_id+'\n elem=#'+href_id+'\n href='+d
                +'\n url='+url);
            wdlog('---- Load target #'+f.id)+' with url='+url;
            f.src = url;
        }else{
            alert('unknown command"'+command+'" '+e.target.id+','+l.id+','+f.id);
        }
    }
    function onKeyDown(e){
        if( e.code == 'Enter' ){
            e.stopPropagation();
            e.preventDefault();
        }
    }
    function onKeyUp(e){
        if( e.code == 'Enter' ){
            e.stopPropagation();
            e.preventDefault();
            // should reload immediately ?
        }
    }

    if( false ){
        wdlog('start settle WirtualBrowser url='+u +'\n'
            + 'id=' + s.id + '\n'
            + 'width=' + s.style.width + '\n'
            + 'height=' + s.style.height
        );
    }
    // very iportant for WordPress ??
    s.style.width = f.style.width = 501; // for WordPress ...??
    s.style.height = f.style.height = 271; // for WordPress ...??
    if( false ){
        wdlog('midway settle WirtualBrowser url='+u +'\n'
            + 'id=' + s.id + '\n'
            + 'width=' + s.style.width + '\n'
            + 'height=' + s.style.height
        );
    }
    s.width = 502; // for WordPress ...??
    s.height = 272; // for WordPress ...??
    if( false ){
        wdlog('midway-2 settle WirtualBrowser url='+u +'\n'
            + 'id=' + s.id + '\n'
            + 'span-width=' + s.width + '\n'
            + 'span-height=' + s.height
        );
    }

    s.style.width = w + 'px';
    s.style.height = h + 'px';
    f.style.width = w + 'px';
```

```
    f.style.height = h + 'px';
    //f.style.setProperty('-webkit-transform','scale('+scale+')');
    f.style.setProperty('transform','scale('+scale+')');

    //wdlog('--x1-- u='+u+' width s='+s.style.width+',f='+f.style.width);
    //wdlog('--x2-- u='+u+' width s='+s.style.width+',f='+f.style.width);
    s.setAttribute('draggable','true')
    f.setAttribute('draggable','false'); // why necessary?
    l.setAttribute('draggable','false'); // why necessary?
    cmd.setAttribute('draggable','false'); // why necessary?
    s.addEventListener('dragstart', e => { onWinDragstart(e); });
    s.addEventListener('drag',  e => { onWinDrag(e); });
    s.addEventListener('exit',  e => { onWinDragexit(e); });
    s.addEventListener('dragend',   e => { onWinDragend(e); });
    s.addEventListener('dragexit',  e => { onWinDragexit(e); });
    s.addEventListener('dragenter', e => { onWinDragenter(e); });
    s.addEventListener('dragover',  e => { onWinDragover(e); });
    s.addEventListener('dragleave', e => { onWinDragleave(e); });
    s.addEventListener('drop',  e => { onWinDragdrop(e); });

    s.addEventListener('mouseenter',e => { onEnterWin(e); });
    s.addEventListener('mouseleave',e => { onLeaveWin(e); });

    if( false ){
        s.style.position = "absolute";
        s.style.x = x+'px';
        s.style.left = x+'px';
        s.style.y = y+'px';
        s.style.top = y+'px';
    }else{
        s.style.setProperty('position','absolute','important');
        s.style.setProperty('x',x+'px','important');
        s.style.setProperty('left',x+'px','important');
        s.style.setProperty('y',y+'px','important');
        s.style.setProperty('top',y+'px','important');
    }

    favicon = './favicon.ico';
    uv1 = u.split('://');
    if( 2 <= uv1.length ){
        uv2 = uv1[1].split('/');
        if( 2 <= uv2.length ){
            if( uv1[0] == 'file' ){
                //favicon = 'file://' + uv2.slice(0,uv2.length-1).join('/')
                //  + '/favicon.ico';
                favcion = './favicon.ico';
            }else{
                favicon = uv1[0] + '://' + uv2[0] + '/favicon.ico';
            }
        }
    }
    //wdlog("----- favicon-url="+favicon);
    href_id = l.id + '_href';
    l.innerHTML = '<img class="WinFavicon" src="'+favicon+'">'
        + '<a id="'+href_id+'" class="WirtualBrowserLocation" href="'+u+'">'+u+'</a>';
    //l.addEventListener('click',   e => { onClickWin(e); });
    l.addEventListener('mouseenter',e => { stopGShell(e); });
    l.addEventListener('mouseleave',e => { contGShell(e); });
    l.addEventListener('keydown',   e => { onKeyDown(e); });
    l.addEventListener('keyup', e => { onKeyUp(e); });

    cmd.href_id = href_id;
    wdlog('(0)cmd=#'+cmd.id);
    wdlog('(1)href_id=#'+href_id);
    wdlog('(2)href_id=#'+cmd.href_id);
    cmd.addEventListener('click',   e => { WirtualBrowserCommand(e,s,l,cmd,f); });

    f.style.borderColor = c;
    f.src = u;
    //f.addEventListener('mouseenter',e => { onEnterWin(e); });
    //f.addEventListener('mouseleave',e => { onLeaveWin(e); });

    //s.addEventListener('click',   e => { onClickWin(e); });
    //f.addEventListener('click',   e => { wdlog('click wb1'); });
    f.addEventListener('mozbrowsericonchange',onFaviconChange);

    wdlog('done settle WirtualBrowser url='+u +'\n'
        + 'id=' + s.id + ' '
        + 'width=' + s.style.width + ' '
        + 'height=' + s.style.height + ' '
        + 'cmd=' + cmd.id
    );
}

function WD_EventSetup2(){
    dt = WirtualDesktop_1;
    dt.style.width = "800px";
    dt.style.height = "500px";
    dt.addEventListener('dragstart',e => { onWinDragstart(e); });
    dt.addEventListener('drag', e => { onWinDrag(e); });
    dt.addEventListener('exit', e => { onWinDragexit(e); });
}

function GRonClick(){
    WD_SaveScope(null); // should be push
    t = event.target;
    x = t.getAttribute('data-leftx');
    y = t.getAttribute('data-topy');
    zoom = WD_Zoom_1_XY.value;
    x *= zoom;
    y *= zoom;
    WD_doScrollXY(event,x,y);
    //alert('scroll #'+t.id+' x='+x+', y='+y);
}
function WD_setGrid(e){
    t = e.target;
    WD_setGrid1(t);
}
function WD_setGrid1(t){
    //ds = WirtualDesktop_1_Content; // should be WirtualSpace_1
    ds = WirtualDesktop_1_GridPlane;
    if( t.value == 'GridOn' ){
        for( col = 0; col < 16; col++ ){
            for( row = 0; row < 16; row++ ){
                g1 = document.createElement('span');
                g1.setAttribute('class','WirtualGrid');
                leftx = col * 800;
                topy = row * 500;
                gid = col + '.' + row
                label = '<'+'span '
                    + 'id="'+gid+'" '+'class="WD_GridScroll" '
                    + 'contenteditable="false" onclick="GRonClick()" '
                    + 'data-leftx=' + leftx + ' ' + 'data-topy=' + topy + ' '
                    + '>'
                    + gid + '<'+'/span>';
                console.log('grid '+label);
                g1.innerHTML = label;
                g1.position = 'relative';
                g1.leftx = leftx;
                g1.topy = topy;
                g1.style.left = g1.leftx + 'px';
                g1.style.top = g1.topy + 'px';
                if( col % 2 == row % 2 ){
                    g1.style.backgroundColor = 'rgba(255,255,255,0.3)';
                }
                ds.appendChild(g1);
            }
        }
        t.value = 'GridOff';
    }else{
        ds.innerHTML = '';
        t.value = 'GridOn';
    }
}

var sav_scrollLeft;
var sav_scrollTop;
var sav_nscale;
function WD_SaveScope(e){
    sav_scrollLeft = WD_Left_1.value;
    sav_scrollTop = WD_Top_1.value;
    sav_nscale = WD_Zoom_1_XY.value;
    //console.log('saved zoom='+sav_oscale+','+sav_nscale);
}
function WD_RestoreScope(e){
    WD_Zoom_1_XY.value = sav_nscale;
    WD_doZoom();

    WD_Left_1.value = sav_scrollLeft;
    WD_Top_1.value = sav_scrollTop;
    WD_doScroll(null);
}
```

```
function ignoreEvent(e){
    e.stopPropagation();
    //e.preventDefault();
}
function zoomMag(){
    return WD_Zoom_1_MAG.value;
}
function WD_EventSetup3(){
    WD_Grid_1.addEventListener('click', e => { WD_setGrid(e); });
    WD_Zoom_1_Save.addEventListener('click', e => { WD_SaveScope(e); });
    WD_Zoom_1_Restore.addEventListener('click', e => { WD_RestoreScope(e); });
    WD_Width_1.value = dt.style.width;
    WD_Width_1.addEventListener('keydown',ignoreEvent);
    WD_Width_1.addEventListener('keyup',ignoreEvent);
    WD_Height_1.value = dt.style.height;
    WD_Height_1.addEventListener('keydown',ignoreEvent);
    WD_Height_1.addEventListener('keyup',ignoreEvent);
    WD_Zoom_1_MAG.addEventListener('keydown',ignoreEvent);
    WD_Zoom_1_MAG.addEventListener('keyup',ignoreEvent);
}

function escale1(e,oscale,nscale){
    e.style.setProperty('transform','scale('+nscale+')');
    rscale = oscale / nscale;
    w = parseInt(e.style.width);
    h = parseInt(e.style.height);
    w = w * rscale; //(oscale/nscale);
    h = h * rscale; //(oscale/nscale);
    e.style.width = w + 'px';
    e.style.height = h + 'px';
}
function scaleWD(ds,oscale,nscale){
    if( true ){
        escale1(WirtualBrowser_1,oscale,nscale);
        escale1(WirtualBrowser_1_Location,oscale,nscale);
        escale1(WirtualBrowser_1_Command,oscale,nscale);
        escale1(WirtualBrowser_1_Frame,oscale,nscale);

        escale1(WirtualBrowser_2,oscale,nscale);
        escale1(WirtualBrowser_2_Location,oscale,nscale);
        escale1(WirtualBrowser_2_Command,oscale,nscale);
        escale1(WirtualBrowser_2_Frame,oscale,nscale);

        escale1(WirtualBrowser_3,oscale,nscale);
        escale1(WirtualBrowser_3_Location,oscale,nscale);
        escale1(WirtualBrowser_3_Command,oscale,nscale);
        escale1(WirtualBrowser_3_Frame,oscale,nscale);
    }
}
function WD_doZoom(){
    ds = WirtualDesktop_1_Content; // should be WirtualSpace_1
    oscale = WD_Zoom_1_XY.ovalue; // hidden value for current zoom
    nscale = WD_Zoom_1_XY.value;
    ds.style.zoom = nscale;
    WD_Zoom_1_XY.value = ds.style.zoom;
    WD_Zoom_1_XY.ovalue = ds.style.zoom;
    scaleWD(ds,oscale,nscale);
}
function WD_EventSetup4(){
    WD_Zoom_1.addEventListener('click',WD_doZoom);
    WD_Zoom_1_XY.addEventListener('keydown',ignoreEvent);
    WD_Zoom_1_XY.addEventListener('keyup',ignoreEvent);
}

function WD_doZoomOUT(){
    ds = WirtualDesktop_1_Content; // should be WirtualSpace_1
    oscale = WD_Zoom_1_XY.value;
    if( oscale == 0 || oscale == '' ){
        oscale = 1;
    }
    nscale = oscale / zoomMag();
    ds.style.zoom = nscale;
    WD_Zoom_1_XY.value = ds.style.zoom;
    WD_Zoom_1_XY.ovalue = ds.style.zoom;
    scaleWD(ds,oscale,nscale);
}
function WD_doZoomIN(){
    ds = WirtualDesktop_1_Content; // should be WirtualSpace_1
    oscale = WD_Zoom_1_XY.value;
    if( oscale == 0 || oscale == '' ){
        oscale = 1;
    }
    nscale = oscale * zoomMag();
    if( 4 < nscale ){
        alert('maybe too large, zoom='+nscale);
        return;
    }
    ds.style.zoom = nscale;
    WD_Zoom_1_XY.value = ds.style.zoom;
    WD_Zoom_1_XY.ovalue = ds.style.zoom;
    scaleWD(ds,oscale,nscale);
}
function WD_EventSetup5(){
    WD_Zoom_1_OUT.addEventListener('click',WD_doZoomOUT);
    WD_Zoom_1_IN.addEventListener('click',WD_doZoomIN);
}

function WD_doResize(e){
    dt = WirtualDesktop_1;
    dt.style.width = WD_Width_1.value;
    dt.style.height = WD_Height_1.value;
    WD_Width_1.value = dt.style.width;
    WD_Height_1.value = dt.style.height;
}
WD_Resize_1.addEventListener('click',e => { WD_doResize(e); });


function WD_doRSResize(e){
    //alert('Resize Space');
    ds = WirtualDesktop_1_Content; // should be WirtualSpace_1
    ds.style.width = WS_1_Width.value;
    ds.style.height = WS_1_Height.value;
    WS_1_Width.value = ds.style.width;
    WS_1_Height.value = ds.style.height;
}
function WD_EventSetup6(){
    ds = WirtualDesktop_1_Content; // should be WirtualSpace_1
    ds.style.width = '5120px';
    ds.style.height = '2880px';
    WS_1_Width.value = ds.style.width;
    WS_1_Height.value = ds.style.height;
    WS_1_Width.addEventListener('keydown',ignoreEvent);
    WS_1_Width.addEventListener('keyup',ignoreEvent);
    WS_1_Height.addEventListener('keydown',ignoreEvent);
    WS_1_Height.addEventListener('keyup',ignoreEvent);
    WS_Resize_1.addEventListener('click',e => { WD_doRSResize(e); });
}

function WD_doScrollXY(e,sleft,stop){
    dt = WirtualDesktop_1;
    dt.scrollLeft = sleft;
    dt.scrollTop = stop;
    WD_Left_1.value = dt.scrollLeft;
    WD_Top_1.value = dt.scrollTop;
    console.log('--Scroll #'+dt.id+' ('+sleft+','+stop+')');
}
function WD_doScroll(e){
    //dt = WirtualDesktop_1_Content;
    dt = WirtualDesktop_1;
    sleft = parseInt(WD_Left_1.value);
    stop = parseInt(WD_Top_1.value);
    dt.scrollLeft = sleft;
    dt.scrollTop = stop;
    WD_Left_1.value = dt.scrollLeft;
    WD_Top_1.value = dt.scrollTop;
    console.log('--Scroll #'+dt.id+' ('+sleft+','+stop+')');
}
function showScrollPosition(){
    if( false )
    console.log(
        'wstop=' + WirtualDesktop_1.style.top + ',' +
        'wsx=' + WirtualDesktop_1.style.y + ',' +
        'wss=' + WirtualDesktop_1.scrollTop + ',' +
        'wdtop=' + WirtualDesktop_1_Content.style.top +',' +
        'wdx=' + WirtualDesktop_1_Content.style.y +',' +
        'wds=' + WirtualDesktop_1_Content.scrollTop + ','
    );
    WD_Left_1.value = WirtualDesktop_1.scrollLeft;
    WD_Top_1.value = WirtualDesktop_1.scrollTop;
}
function WD_EventSetup7(){
    WD_Scroll_1.addEventListener('click',e => { WD_doScroll(e); });
```

```
    WD_Left_1.addEventListener('keydown',ignoreEvent);
    WD_Left_1.addEventListener('keyup',ignoreEvent);
    WD_Top_1.addEventListener('keydown',ignoreEvent);
    WD_Top_1.addEventListener('keyup',ignoreEvent);
}
function WD_EventSetup8(){
    WirtualDesktop_1.addEventListener('scroll',showScrollPosition);
    WirtualDesktop_1_Content.addEventListener('scroll',showScrollPosition);
}

if( false ){
w = 1000 + 'px';
dt.style.width = w;
dt.style.height = "300px";
dt.style.resize = 'both';
dt.style.borderWidth = 50 + 'px';
dt.style.borderRadius = 25 + 'px';
console.log('--2---------- #'+dt.id+' style=' +dt.style);
console.log('-------------- #'+dt.id+' width=' +dt.style.width);
console.log('-------------- #'+dt.id+' left='  +dt.style.left);
console.log('-------------- #'+dt.id+' border='+dt.style.border);
}
function onDTResize(e){
    dt = e.target;
    h = parseInt(dt.style.height);
    dt.style.borderWidth = (h * 0.075) + 'px';
    console.log('---------------- borderWidgh='+dt.style.borderWidth);
}

WirtualDesktopDetails.addEventListener('toggle',WirtualDesktop_init);
function WirtualDesktop_init(){
    if( !WirtualDesktopDetails.open ){
        return;
    }
    //GJ_Join();
    WirtualDesktop_1.addEventListener('resize', e => { onDTResize(e); });
    //console.log('-------------- #'+dt.id
    //  +' borderWidth='+dt.style.getProperty('border-width'));

    settleWin(
        WirtualBrowser_1,
        WirtualBrowser_1_Location,
        WirtualBrowser_1_Command,
        WirtualBrowser_1_Frame,
        document.URL,
        500,280,50,20,'#262',1.0);
    settleWin(
        WirtualBrowser_2,
        WirtualBrowser_2_Location,
        WirtualBrowser_2_Command,
        WirtualBrowser_2_Frame,
        'https://its-more.jp/ja_jp/',
        500,280,150,100,'#448',1.0);
    settleWin(
        WirtualBrowser_3,
        WirtualBrowser_3_Location,
        WirtualBrowser_3_Command,
        WirtualBrowser_3_Frame,
        //'../gshell/gsh.go.html',
            //'http://gshell.org/gshell/gsh.go.html',
        'https://golang.org',
        500,280,250,180,'#444',1.0);
        //1000,720,0,0,'#444',0.125);
        //1200,720,-100,-50,'#444',0.4);
    function WD_ClockUpdate(e){
        WirtualDesktop_1_Clock.innerHTML = DateShort();
        WirtualDesktop_1_Calender.innerHTML = DateHourMin();
    }
    window.setInterval(WD_ClockUpdate,500);

    WD_EventSetup1();
    WD_EventSetup2();
    WD_EventSetup3();
    WD_EventSetup4();
    WD_EventSetup5();
    WD_EventSetup6();
    WD_EventSetup7();
    WD_EventSetup8();
}
//WirtualDesktop_init();

Destroy_WirtualDesktop = function(){
    WirtualDesktop_1.style = "";

    WirtualBrowser_1.removeAttribute('style');
    WirtualBrowser_1_Location.innerHTML = '';
    WirtualBrowser_1_Frame.removeAttribute('src');
    WirtualBrowser_1_Frame.removeAttribute('style');
    WirtualBrowser_1_Frame.style="";

    WirtualBrowser_2.removeAttribute('style');
    WirtualBrowser_2_Location.innerHTML = '';
    WirtualBrowser_2_Frame.removeAttribute('src');
    WirtualBrowser_2_Frame.style="";

    WirtualBrowser_3.removeAttribute('style');
    WirtualBrowser_3_Location.innerHTML = '';
    WirtualBrowser_3_Frame.removeAttribute('src');
    WirtualBrowser_3_Frame.style="";

    GJFactory_1.style = "";
    iframe0.style = "";
    WirtualDesktop_1.style = "";
}
</script>
<!-- WirtualDesktop } -->
</details>
*/ //</span>

//<!-- ========== Work { ========== -->
//<span id="SBSidebar_WorkCodeSpan">
/*
<details><summary>SBSidebar</summary>
<!-- ---------- SBSidebar // 2020-0928 SatoxITS { -->
<h2>SBSidebar</h2>
<input id="SBSidebar_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="SBSidebar_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<input id="SBSidebar_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<span id="SBSidebar_WorkCodeView"></span>
<script id="SBSidebar_WorkScript">
function SBSidebar_openWorkCodeView(){
    function SBSidebar_showWorkCode(){
        showHtmlCode(SBSidebar_WorkCodeView,SBSidebar_WorkCodeSpan);
    }
    SBSidebar_WorkCodeViewOpen.addEventListener('click',SBSidebar_showWorkCode);
}
SBSidebar_openWorkCodeView(); /// should be invoked by an event

console.log('-- SbSlider // 2020-1006-01 SatoxITS --');
function SetSidebar(){
    sidebar = document.getElementById('secondary');
//  console.log('primary='+primary+' + 'secondary='+sidebar+' + 'main='+main+' ');
    wrap = sidebar.parentNode;
    console.log('-- SbSlider parent is '+wrap+', #'+wrap.id+' .'+wrap.class);
//wwrap = wrap.parentNode;
//console.log('-- SbSlider parent is '+wwrap+', #'+wwrap.id+' .'+wwrap.class);
//wwwrap = wwrap.parentNode;
//console.log('-- SbSlider parent is '+wwwrap+', #'+wwwrap.id+' .'+wwwrap.class);
//nsb = sidebar.cloneNode();
    nsb = sidebar;
    nsb.style.width = '100%';
    slider = document.createElement('div');
    slider.id = 'SbSlider';
    slider.appendChild(nsb);
    slider.setAttribute('class','SbSlider');
    nsb.style.position = 'relative';
    slider.style.position = 'fixed';
    slider.style.display = 'block'; //'inline';
    slider.style.zIndex = 100000;
    // nsb.style.zIndex = 200000;
    nsb.style.position = 'absolute';
    nsb.style.minWidth = '80px';
    nsb.style.left = '0px';
    nsb.style.top = '0px';

    w = window.innerWidth;
    console.log('SliderWidth '+w+': ',(w/3)+'px');
    if( w < 640 ){
        slider.style.setProperty('width',(w/3) + 'px','important');
    }
    main.style.marginLeft = (parseInt(slider.style.width)/2 - 20) + 'px';
```

```
11502
11503     slider.style.resize = "both";
11504     slider.draggable = "true";
11505     wrap.appendChild(slider);
11506     console.log('-- added SbSlider');
11507     //nsb.addEventListener('scroll',SbScrolled);
11508
11509     buttons = document.createElement('div');
11510     buttons.id = 'NaviButtons';
11511     buttons.setAttribute('class','NaviButtons');
11512     buttons.align = "center";
11513     buttons.innerHTML += '<'+'p><a href="#TopOfPost" draggable="true">TOP<'+'/a><'+'/p>';
11514     buttons.innerHTML += '<'+'p><a href="#EndOfPost" draggable="true">END<'+'/p>';
11515     page.appendChild(buttons);
11516     buttons.style.position = 'fixed';
11517     buttons.style.zIndex = 30000;
11518     buttons.style.width = '180%';
11519     buttons.style.top = '320px';
11520     buttons.style.left = parseInt(w) * 1.0 + 'px';
11521     console.log('-- SbSlider installed (^-^)/ SatoxITS');
11522 }
11523 //window.addEventListener('load',SetSidebar); // after load
11524 DestroyNaviButtons = function(){
11525     nb = document.getElementById('NaviButtons');
11526     if( nb != null ){
11527         nb.parentNode.removeChild(NaviButtons);
11528     }
11529 }
11530 </script>
11531
11532 // 2020-1006 its-more.jp-blog-60000-style.css
11533 <!-- {
11534 <style>
11535 #NaviButtons {
11536     position:fixed;
11537     display:block;
11538     xwidth:100%;
11539     xxtop:100px;
11540     xxleft:10px;
11541     z-index:30000;
11542     font-size:10pt;
11543     color:#2ff !important;
11544     text-align:center;
11545     background-color:rgba(230,230,230,0.01);
11546 }
11547 #NaviButtons a {
11548     color:#2a2 !important;
11549     font-size:20px;
11550     text-align:center;
11551     xxtext-shadow:2px 2px #8ff;
11552     resize:both;
11553     padding:6px;
11554     margin:10px;
11555     border:1px solid #288 !important;
11556     border-radius:3px;
11557     background-color:rgba(160,160,160,0.05);
11558 }
11559 #SbSlider {
11560     overflow:auto;
11561     resize:both !important;
11562     xxoverflow-y:hidden !important;
11563     height:100px !important;
11564     display:inline !important;
11565     position:fixed !important;
11566     left:0px;
11567     top:0px;
11568     xxwidth:180px;
11569     width:24%;
11570     min-width:80px;
11571     height:100% !important;
11572     background-color:rgba(100,100,200,0.1);
11573 }
11574 #secondary {
11575     position:fixed;
11576     left:0px;
11577     top:0px;
11578     xxxz-index:60000;
11579     scroll-behavior: overflow !important;
11580     xxxxxxxxxxxxxxxxxxxxxxxxxxwidth:18% !important;
11581     padding-left:4pt;
11582     color:#fff;
11583     font-size:0.5em;
11584     background-color:rgba(64,160,64,0.6) !important;
11585     white-space:nowrap;
11586 }
11587 #secondary a {
11588     color:#fff !important;
11589     text-decoration:disable !important;
11590 }
11591 #primary {
11592     position:relative;
11593     width:75% !important;
11594     left:25% !important;
11595 }
11596 #main {
11597     position:relative;
11598     width:75% !important;
11599     left:25% !important;
11600 }
11601 #site-navigation {
11602     position:relative;
11603     left:120px;
11604 }
11605 #adswsc_countertext {
11606     color:#4169e1;
11607     font-size:16pt !important;
11608     xxfont-size:10% !important;
11609     font-weight:bold;
11610 }
11611 #nowTime {
11612     color:#a0ffa0;
11613     font-size:16pt !important;
11614     xxfont-size:10% !important;
11615     font-weight:bold;
11616     text-shadow:1px 1px #fff;
11617 }
11618 .navigation-top {
11619     color:#22a !important;
11620     border:0px;
11621     background-color:rgba(220,220,220,0.1);
11622 }
11623
11624 .visible-scrollbar, .invisible-scrollbar, .mostly-customized-scrollbar {
11625   display: block;
11626   xxwidth: 1em;
11627   xxoverflow: auto;
11628   xxheight: 1em;
11629 }
11630 .invisible-scrollbar ::-webkit-scrollbar {
11631   xxdisplay: none;
11632  width:1px !important;
11633  height:1px !important;
11634 }
11635 .mostly-customized-scrollbar ::-webkit-scrollbar {
11636   width: 2px;
11637   height: 2px;
11638   xxbackground-color: #aaa; xxx:or add it to the track;
11639 }
11640 .mostly-customized-scrollbar ::-webkit-scrollbar-thumb {
11641     background: #000;
11642 }
11643 </style>
11644 } -->
11645
11646
11647 </details>
11648 <!-- SBSidebar_WorkCodeSpan } -->
11649 */ //</span>
11650 //<!-- ========== Work } ========== -->
11651
11652
11653 //<!-- ========== Work { ========== -->
11654 //<span id="Affiliate_WorkCodeSpan">
11655 /*
11656 <details id="Affiliate_Test"><summary>Affiliate</summary>
11657 <!-- ---------- Affiliate // 2020-1010 SatoxITS { -->
11658 <div id="AffViewDock">
11659 <div id="AffView" class="AffView" draggable="true" style="">
11660 <div id="AffiSet" class="AffPlate">
11661  <iframe id="aff_0" class="AffItem"></iframe>
11662  <iframe id="aff_1" class="AffItem"></iframe>
11663  <iframe id="aff_2" class="AffItem"></iframe>
```

```
<iframe id="aff_3" class="AffItem"></iframe>
<iframe id="aff_4" class="AffItem"></iframe>
<iframe id="aff_5" class="AffItem"></iframe>
</div>
</div></div>
<h2>Supportive Affiliate</h2>
<style>
.AffView {
    z-index:0;
    overflow-x:scroll;
    overflow-y:scroll;
    position:fixed;
    max-width:2560px;
    max-height:100%;
    width:270px;
    left:75%;
    height:95%;
    resize:both;
    xleft:-10%;
    margin-top:40px;
    xleft:0;
    xxalign:right;
    display:block;
    border:4px inset rgba(255,255,255,0.1);
    background-color:rgba(255,255,255.0.1);
}
.AffView:hover {
    z-index:1;
    width:300px;
    overflow:scroll;
    border:4px inset #fcc;
    background-color:rgba(80,80,255.0.2);
    background-color:#ffc;
}
.AffPlate:hover {
    border-left:4px dashed #888;
}
.AffPlate{
    overflow-x:visible;
    border-left:4px dashed rgba(255,255,255,0.1);
    max-width:2560px;
    max-height:2880px;
    margin-top:10px;
    margin-bottom:10px;
    margin-left:4px;
    width:300px;
    xheight:1440px;
}
.AffItem {
    overflow-x:visible;
    xoverflow-y:scroll;
    max-width:2560px;
    max-height:1440px;
    z-index:0;
    display:block;
    xposition:fixed;
    xposition:absolute;
    position:relative;
    //left:300px;
    xresize:both;
    padding:0px;
    width:600px;
    height:400px;
    max-height:800px !important;
    margin-top:0%;
    margin-left:0%;
    margin-right:0% !important;
    border:16px inset #ccc;
    transform:scale(0.5);
    background-color:rgba(255,255,255,0.2);
    xxalign:right;
}
.AffItem:hover {
    border:16px inset #bbf;
}
</style>
<input id="Affiliate_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="Affiliate_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="Affiliate_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<span id="Affiliate_WorkCodeView"></span>
<script id="Affiliate_WorkScript">
function Affiliate_openWorkCodeView(){
    function Affiliate_showWorkCode(){
        showHtmlCode(Affiliate_WorkCodeView,Affiliate_WorkCodeSpan);
    }
    Affiliate_WorkCodeViewOpen.addEventListener('click',Affiliate_showWorkCode);
}
Affiliate_openWorkCodeView(); /// should be invoked by an event

///<iframe id="aff_8" xxsrc="https://stackoverflow.com/tags" class="AffItem"></iframe>
///<iframe id="aff_9" xxsrc="https://developer.mozilla.org/en-US/docs/Web" class="AffItem"></iframe>
var Aff_isSetup = false;
Affiliate_Test.addEventListener('click',Aff_Setup);
function Aff_Setup(){
    if( Aff_isSetup ){ return; } Aff_isSetup = true;
    parent = document.documentElement;
    parent.appendChild(AffView);
    AffView.style.top = '0px';
    AffView.style.left = (window.innerWidth - 280) + 'px';

    var off = 100;
    zoom = 0.5;
    ozoom = 0.3;
    leftx = window.innerWidth - 300;
    left = leftx + 'px';
left = -130 + 'px';
    console.log('aff-init window.innerWidth='+window.innerWidth);
    w = 1000;
    h = 560;

    aff_0.src="../gshell/gsh.go.html";
    aff_1.src="https://golang.org";
    aff_2.src="https://drafts.csswg.org/";
    aff_3.src="https://html.spec.whatwg.org/dev/";
    aff_4.src="https://wikipedia.org";
    aff_5.src="https://www.bing.com/translator";

    //parent.appendChild(aff_0);
    aff_0.style.width = zoom*w+'px';
    aff_0.style.height = zoom*h+'px';
    aff_0.style.left = left;
    //aff_0.style.top = off+'px'; off += ozoom*h;
    aff_0.draggable = 'true';

    //parent.appendChild(aff_1);
    aff_1.style.width = zoom*w+'px';
    aff_1.style.height = zoom*h+'px';
    aff_1.style.left = left;
    //aff_1.style.top = off+'px'; off += ozoom*h;
    aff_1.style.top = '-150px';
    aff_1.draggable = 'true';

    //parent.appendChild(aff_2);
    aff_2.style.width = zoom*w+'px';
    aff_2.style.height = zoom*h+'px';
    aff_2.style.left = left;
    //aff_2.style.top = off+'px'; off += ozoom*h;
    aff_2.style.top = '-300px';
    aff_2.draggable = 'true';

    //parent.appendChild(aff_3);
    aff_3.style.transform = 'scale(0.25)';
    aff_3.style.width = 2*zoom*w+'px';
    aff_3.style.height = 2*zoom*h+'px';
    aff_3.style.border = '32px inset #ccc';
    //aff_3.style.left = -390 + 'px'; //left*2;
    //aff_3.style.left = (leftx - 265) + 'px';
    aff_3.style.left = -395 + 'px';
    //aff_3.style.top = (-155+off)+'px'; off += ozoom*h;
    aff_3.style.top = '-600px';
    aff_3.draggable = 'true';

    //parent.appendChild(aff_4);
    aff_4.style.width = zoom*w+'px';
    aff_4.style.height = zoom*h+'px';
    aff_4.style.left = left;
    //aff_4.style.top = off+'px'; off += ozoom*h;
    aff_4.style.top = '-900px';
    aff_4.draggable = 'true';

    //parent.appendChild(aff_5);
    aff_5.style.transform = 'scale(0.300)';
```

```
    aff_5.style.width = zoom*(w*1.67)+'px';
    aff_5.style.height = zoom*(h*1.67)+'px';
    aff_5.style.border = '25px inset #ccc';
    aff_5.style.left = -308+'px';
    //aff_5.style.left = (-175+leftx)+'px';
    //aff_5.style.top = (-95+off)+'px'; off += ozoom*h;
    //aff_5.style.left = '0px';
    //aff_5.style.top = '0px';
    aff_5.style.top = '-1150px';
    ///aff_5.style.align = 'right';
    aff_5.draggable = 'true';
}
function affresize(){
    AffView.style.left = (window.innerWidth - 280) + 'px';
    leftx = window.innerWidth - 400;
    left = leftx + 'px';
    console.log('aff-resize window.innerWidth='+window.innerWidth);
}
window.addEventListener('resize',affresize);
//document.addEventListener('resize',affresize);
//gsh.addEventListener('resize',affresize);

function ResetAffView(){
    AffViewDock.appendChild(AffView);
    AffView.removeAttribute('style');
    aff_0.removeAttribute('src');
    aff_0.removeAttribute('style'); aff_0.removeAttribute('draggable');
    aff_1.removeAttribute('src');
    aff_1.removeAttribute('style'); aff_1.removeAttribute('draggable');
    aff_2.removeAttribute('src');
    aff_2.removeAttribute('style'); aff_2.removeAttribute('draggable');
    aff_3.removeAttribute('src');
    aff_3.removeAttribute('style'); aff_3.removeAttribute('draggable');
    aff_4.removeAttribute('src');
    aff_4.removeAttribute('style'); aff_4.removeAttribute('draggable');
    aff_5.removeAttribute('src');
    aff_5.removeAttribute('style'); aff_5.removeAttribute('draggable');
}
</script>
</details>
<!-- Affiliate_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//<!-- ========== Work { ========== -->
//<span id="FontSelector_WorkCodeSpan">
/*
<details><summary>Font Selector</summary>
<!-- ---------- FontSelector // 2020-1013 SatoxITS { -->
<h2>Font Selection</h2>
<div>
<div id="FontList"></div>
</div>
<style>
#FontList {
    overflow:visible;
    background-color:rgba(240,245,255,1.0) !important;
}
#FontList td {
    font-size:20px;
    padding:0px;
    padding-left:2px;
    padding-right:2px;
    margin:0px;
    line-height:1.2;
    border:0px;
}
#FontList tr:hover {
    color:#fff;
    background-color:#000;
    xxborder:1px solid #000;
}
.xcourier { colr=#000; font-size:16px; font-family:courier; }
.xcursive { colr=#000; font-size:16px; font-family:cursive; }
.xfantasy { colr=#000; font-size:16px; font-family:fantasy; }
.xgeorgia { colr=#000; font-size:16px; font-family:georgia; }
.xmonospace { colr=#000; font-size:16px; font-family:monospace; }
</style>
<script>
function fontstr(name,text){
    //tr = '<'+'tr style=\'font-family:"'+name+'";\'>\n';
    tr = '<'+'tr style=\'font-family:'+name+';\'>\n';
    tr += '<'+'td style="font-family:Arial;font-size:12pt;">'+name+'<'+'/td>';
    tr += '<'+'td>'+text+'<'+'/td>';
    tr += '<'+'td><'+'b>'+text+'<'+'/b><'+'/td>';
    tr += '<'+'td><'+'i>'+text+'<'+'/i><'+'/td>';
    tr += '<'+'td><'+'b><'+'i>'+text+'<'+'/i><'+'/b><'+'/td>';
    tr += '<'+'/tr>';
    return tr;
}
function lsfont(){
    text = 'GShell-Go012';

    fl = '';
    fl += '<table>\n'
    fl += fontstr('Arial',text);
    fl += fontstr('Courier',text);
    fl += fontstr('Courier New',text);
    fl += fontstr('Georgia',text);
    fl += fontstr('Helvetica',text);
    fl += fontstr('Verdana',text);
    fl += fontstr('Times',text);

    fl += fontstr('Osaka',text);
    fl += fontstr('Meiryo',text);
    fl += fontstr('YuMincho',text);

    //fl += fontstr('Roman',text);
    //document.fonts.load("30px cursive");
    fl += fontstr('Serif',text);
    fl += fontstr('Sans-Serif',text);
    fl += fontstr('System-UI',text);
    fl += fontstr('Monospace',text);
    fl += fontstr('Cursive',text);
    fl += fontstr('Fantasy',text);
    fl += '</table>\n'

    if( false ){
        fss = document.fonts.entries(); // FontFaceSet
        console.log('FSS='+fss);
        while( true ){
            font = fss.next();
            if( font.done ){
                break;
            }
            fl += font.value[0] + '<br>';
        }
    }
    FontList.innerHTML = fl;
}
function FontList_Setup(){
    lsfont();
}
document.fonts.onloadingdone = function(fsse){
    //alert('font-loaded '+fsse.fontfaces.length);
}
</script>


<h2>Drawing Text on Canvas</h2>
<!-- 2020-1012 -- Drawing Text on Canvas // SatoxITS { -->
<div id="TextCanvas_1_Panel" class="TextCanvasPanel">
<input id="TextCanvas_1_Clear" class="PanelButton" type="button" value="Clear">
<input id="TextCanvas_1_Draw" class="PanelButton" type="button" value="Draw">
<input id="TextCanvas_1_Font" class="CanvasPanel" type="text" size="14" value="Georgia">
<input id="TextCanvas_1_Size" class="CanvasPanel" type="text" size="3" value="64">Pixels
<input id="TextCanvas_1_Bold" class="CanvasBox" type="checkbox" checked="">Bold
<input id="TextCanvas_1_Italic" class="CanvasBox" type="checkbox" checked="">Italic
<p>
<input id="TextCanvas_1_Text" type="text" size="50" value="GShell">
</p>
</div>
<p>
<canvas id="TextCanvas_1" class="TextCanvas" width="400px" height="100px" draggable="true"></canvas>
</p>
<style>
.CommandUsageText {
    font-family:Courier New;
}
.TextCanvas {
```

```
    border:1px solid #000;
    resize:both;
    display:inline !important;
}
.CanvasBox {
    vertical-align:middle;
    margin-left:4px !important;
    margin-right:2px !important;
}
.CanvasPanel {
    vertical-align:middle !important;
    height:14pt !important;
    width:inherit !important;
    padding:2px !important;
    margin:4px !important;
    margin-left:4px !important;
    margin-right:2px !important;
    font-size:10pt !important;
    font-family:Georgia !important;
    color:#000;
    display:inline !important;
}
.TextCanvaslPanel {
    vertical-align:middle;
    font-size:10pt !important;
    font-family:Georgia !important;
    color:#000;
    display:inline !important;
}
.PanelButton {
    font-size:10pt !important;
    font-family:Georgia !important;
    vertical-align:middle;
    width:45pt !important;
    height:14pt !important;
    line-height:1.2 !important;
    padding:2px !important;
    margin:1px !important;
    display:inline !important;
    padding:1px !important;
    color:#fff !important;
    background-color:#228 !important;
}
</style>
<script>
function DrawTextCanvas(){
    ctx = TextCanvas_1.getContext('2d');
    var textfont = '';
    if( TextCanvas_1_Italic.checked ) textfont += ' italic';
    if( TextCanvas_1_Bold.checked ) textfont += ' bold';
    textfont += ' '+TextCanvas_1_Size.value+'px';
    textfont += ' '+TextCanvas_1_Font.value;
    //ctx.font = 'italic bold 64px Georgia';
    //console.log('TxFont='+textfont);
    ctx.font = textfont;
    ctx.fillText(TextCanvas_1_Text.value,10,80);
}
DrawTextCanvas();
TextCanvas_1_Draw.addEventListener('click',DrawTextCanvas);
function ClearTextCanvas(){
    cv = TextCanvas_1;
    ctx = cv.getContext('2d');
    ctx.clearRect(0,0,cv.width,cv.height);
}
TextCanvas_1_Clear.addEventListener('click',ClearTextCanvas);
</script>
<!-- } -->

<script>
//TextCanvas_1_Panel.addEventListener('mousein',OffGJShell);
//TextCanvas_1_Panel.addEventListener('mouseout',OnGJShell);
</script>
</details>
<!-- FontSelector_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//<!-- ========== Work { ========== -->
//<span id="Shading_WorkCodeSpan">
/*
<details><summary>Shading Canvas</summary>
<!-- ---------- Shading Canvas // 2020-1011 SatoxITS { -->
<h2>Shading Canvas</h2>
<note class="CommandUsageText">
<b>Commands</b><br>
Placement Mode<br>
a ... apply (into absolute position)<br>
j ... bring down (ArrowDown)<br>
k ... bring up (ArrowUp)<br>
h ... bring left (ArrowLeft)<br>
l ... bring right (ArrowRight)<br>
0 ... z-index = 0<br>
+ ... z-index += 1<br>
- ... z-index -= 1<br>
r ... return to here (relative position)<br>
c ... clear the log text<br>
Note: the HTML text must be contenteditable to catch Key Event.<br>
</note>


<div id="Shading_1" class="ShadingPlate" draggable="true" contenteditable="true">
<div id="Shading_1_Html" class="ShadingHtml" draggable="true"></div>
<div id="Shading_1_Log" class="ShadingLog" draggable="true" style=""></div>

<canvas id="Shading_1_Canvas" class="ShadingCanvas" width="300px" height="300px" draggable="true" style="">My Canvas.</canvas></div>
<style>
.ShadingPlate {
    z-index:0;
    position:static;
    overflow:scroll;
    display:block;
    width:100%;
    height:400px;
    font-size:9pt;
    font-family:Courier New;
    border:1px dashed #000;
    color:#444;
}
.ShadingLog {
    z-index:0;
    position:relative;
    display:block;
    top:0px;
    left:0px;
    overflow:scroll;
    width:100%;
    font-size:9pt;
    font-family:Courier New;
    color:#666;
    overflow:scroll;
    background:rgba(200,255,200,0.4);
    height:400px;
}
.ShadingHtml {
    z-index:2;
    position:relative;
    display:block;
    top:0px;
    left:0px;
    overflow:scroll;
    width:100%;
    font-size:12pt;
    font-family:Courier New;
    color:#666;
    overflow:scroll;
    background:rgba(200,255,200,0.4);
    height:400px;
}
.ShadingCanvas {
    z-index:3;
    position:relative;
    xdisplay:block;
    top:0px;
    left:100px;
    resize:both;
    border:1px solid #000;
}
</style>
<input id="Shading_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="Shading_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="Shading_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
```

```
<span id="Shading_WorkCodeView"></span>
<script id="Shading_WorkScript">
function Shading_openWorkCodeView(){
    function Shading_showWorkCode(){
        showHtmlCode(Shading_WorkCodeView,Shading_WorkCodeSpan);
    }
    Shading_WorkCodeViewOpen.addEventListener('click',Shading_showWorkCode);
}
const BR = '<'+'br>';
Shading_openWorkCodeView(); /// should be invoked by an event
    function sh_onClick(e){
        Shading_1_Log.innerHTML += 'Click '+e.target.nodeName+'#'+e.target.id
            +' offset('+e.offsetX+','+e.offsetY+')'
            +' client('+e.clientX+','+e.clientY+')'
            +' page('+e.pageX+','+e.pageY+')'
            +' screen('+e.screenX+','+e.screenY+')'
            +BR;
        e.stopPropagation();
        e.preventDefault();
    }
    function sh_onKeyup(e){
        if( Shading_1.style.zIndex == '' ){
            Shading_1.style.zIndex = 0;
        }
        zi = parseInt(Shading_1.style.zIndex);

        if( e.key.length == 1 ){
            Shading_1_Html.innerHTML += e.key;
        }

        if( e.key == '0' ){ zi = 0; }else
        if( e.key == '+' ){ zi += 1; }else
        if( e.key == '-' ){ zi -= 1; }else
        if( e.key == 'c' ){
            Shading_1_Log.innerHTML = '';
        }else
        if( e.key == 'r' ){
            Shading_1.style.position = "relative";
            Shading_1.style.top = '0px';
            Shading_1.style.left = '0px';
            zi = 0;
        }else
        if( e.key == 'j' || e.code == 'ArrowDown' ){
            topx = parseInt(Shading_1.style.top) + 50;
            Shading_1.style.top = topx + 'px';
        }else
        if( e.key == 'k' || e.code == 'ArrowUp' ){
            topx = parseInt(Shading_1.style.top) - 50;
            Shading_1.style.top = topx + 'px';
        }else
        if( e.key == 'l' || e.code == 'ArrowRight' ){
            lefty = parseInt(Shading_1.style.left) + 50;
            Shading_1.style.left = lefty + 'px';
        }else
        if( e.key == 'h' || e.code == 'ArrowLeft' ){
            lefty = parseInt(Shading_1.style.left) - 50;
            Shading_1.style.left = lefty + 'px';
        }else
        if( e.key == 'a' ){
            Shading_1.style.position = "absolute";
            Shading_1.style.top = '0px';
            Shading_1.style.left = '0px';
        }else{
        }
        Shading_1.style.zIndex = zi;
        Shading_1_Log.innerHTML += 'Keyup..'+e.target.nodeName+'#'+e.target.id
            +'Up('+e.key+'/'+e.code+')'
            +'z-index:'+zi+'/'+Shading_1.style.zIndex
            +'top:'+Shading_1.style.top
            +BR;
        e.stopPropagation();
        e.preventDefault();
    }
    function sh_onKeydown(e){
        Shading_1_Log.innerHTML += 'Keydown'+e.target.nodeName+'#'+e.target.id
            +'Down('+e.key+'/'+e.code+')'+BR;
        e.stopPropagation();
        e.preventDefault();
    }
function Shading_Setup(){
    Shading_1_Log.innerHTML += '<'+'h4>Click here<'+'/h4>';
    Shading_1.addEventListener('keydown',sh_onKeydown);
    Shading_1.addEventListener('keyup',sh_onKeyup);
    Shading_1.addEventListener('click',sh_onClick);
    Shading_1.addEventListener('click',sh_onClick);

    Shading_1_Log.style.top = "-400px";
    Shading_1_Log.style.left = "200px";

    Shading_1.appendChild(Shading_1_Canvas);
    Shading_1_Canvas.style.width = "300px";
    Shading_1_Canvas.style.height = "300px";
    Shading_1_Canvas.style.position = "relative";
    Shading_1_Canvas.style.top = "-750px";
    Shading_1_Canvas.style.left = "100px";

    const ctx = Shading_1_Canvas.getContext('2d');
    ctx.fillStyle = 'rgba(160,0,0,0.9)';
    ctx.fillRect(50,50,40,40);
    ctx.fillStyle = 'rgba(0,160,0,0.9)';
    ctx.fillRect(60,60,40,40);
    ctx.fillStyle = 'rgba(0,0,160,0.9)';
    ctx.fillRect(70,70,40,40);
}
function Reset_ShadingCanvas(){
    Shading_1_Log.removeAttribute('style');
    Shading_1_Log.innerHTML = '';
    Shading_1_Canvas.style = "";
    //Shading_1_Canvas.removeAttribute('style');
}

</script>
</details>
<!-- Shading_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//<!-- ========== Work { ========== -->
//<span id="Charmap_WorkCodeSpan">
/*
<details id="Charmap_Work"><summary>Character Map</summary>
<!-- ---------- UnicodeCharmap // 2020-1015 SatoxITS { -->
<h2>Unicode Character Map</h2>
<note>code 0x0000 - 0xFFFF / 16px / 3200 x 3200 px / zoom:0.25</note>
<div id="Charmap_1_Frame">
<div id="Charmap_1_Text" class="Charmap">
</div>
</div>
<br>

<style>
#Charmap_1_Frame {
    overflow:scroll;
    height:3200px; width:3200px;
    xtransform:scale(0.5);
    zoom:0.25;
    resize:both;
    background-color:#fff;
}
.Charmap {
    xzoom:0.25;
    font-size:16px;
    line-height:1.0;
    xxfont-family:Georgia;
    color:#000;
}
</style>
<script>
function charmapgen(){
    text = '';
    for( cc = 0; cc < 0x10000; cc++ ){
        text += String.fromCharCode(cc);
    }
    Charmap_1_Text.innerHTML = text;
}
Charmap_Work.addEventListener('click',charmapgen);
//charmapgen();
</script>

<input id="Charmap_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="Charmap_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
```

```
<input id="Charmap_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<span id="Charmap_WorkCodeView"></span>
<script id="Charmap_WorkScript">
function Charmap_openWorkCodeView(){
    function Charmap_showWorkCode(){
        showHtmlCode(Charmap_WorkCodeView,Charmap_WorkCodeSpan);
    }
    Charmap_WorkCodeViewOpen.addEventListener('click',Charmap_showWorkCode);
}
Charmap_openWorkCodeView(); /// should be invoked by an event
</script>
</details>
<!-- Charmap_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//<!-- ========== Work { ========== -->
//<span id="Pointillism_WorkCodeSpan">
/*
<details><summary>Collaborated Pointillism</summary>
<!-- ---------- CollaboratedPointillism // 2020-1016 SatoxITS { -->
<h2><a name="Pointillism" class="Pointillism"></a><a href="#Pointillism">Collaborated Pointillism</a></h2>

<input id="Pointillism_1_Share" type="checkbox" class="HtmlCodeViewButton" value="Share"> Share
<input type="button" class="HtmlCodeViewButton" onclick="Pointillism_1_ResetCanvas()" value="Reset">
<input type="button" class="HtmlCodeViewButton" onclick="Pointillism_1_ClearCanvas()" value="Clear">
<input type="button" class="HtmlCodeViewButton" onclick="Pointillism_1_ReplayCanvas()" value="Replay">
<input type="button" class="HtmlCodeViewButton" onclick="Pointillism_1_RepeatCanvas()" value="Repeat">
<input type="button" class="HtmlCodeViewButton" onclick="Pointillism_1_ClearCanvas()" value="Save">
<input type="button" class="HtmlCodeViewButton" onclick="Pointillism_1_ClearCanvas()" value="Load">
<div id="Pointillism_1" class="Pointillism">

<span id="Pointillism_1_Unit_1" class="Pointillism_Unit">
<span id="Pointillism_1_XY_1" class="Pointillism_XY">XY1</span>
<span id="Pointillism_1_XY_1_Remote" class="Pointillism_XY_Remote">XY1-remote</span>
<canvas id="Pointillism_1_Canvas_1" class="Pointillism_Canvas" width="300px" height="300px"></canvas>
</span>

<span id="Pointillism_1_Unit_2" class="Pointillism_Unit">
<span id="Pointillism_1_XY_2" class="Pointillism_XY">XY2</span>
<span id="Pointillism_1_XY_2_Remote" class="Pointillism_XY_Remote">XY2-remote</span>
<canvas id="Pointillism_1_Canvas_2" class="Pointillism_Canvas" width="300px" height="300px"></canvas>
</span>

</div>
<br>

<style>
.Pointillism {
    xdisplay:block;
    resize:both;
    width:680px;
    height:380px;
    min-width:240px;
    min-height:270px;
    background-color:#eee;
    overflow:scroll;
    font-size:16px;
    font-family:Georgia;
    color:#000;
    vertical-align:middle;
}
.Pointillism_Unit {
    position:relative;
    top:0px;
    display:block;
    overflow:scroll;
    width:300px;
    height:350px;
    margin:5px;
    padding:10px;
    background-color:rgba(255,255,127,0.7);
}
.Pointillism_XY {
    display:block;
    vertical-align:middle;
    width:290px;
    xxheight:20px;
    font-size:12px;
    line-height:1.2;
    padding:5px;
    margin:0px;
    color:#fff;
    background-color:#44c;
}
.Pointillism_XY_Remote {
    display:block;
    vertical-align:middle;
    width:290px;
    xxheight:20px;
    font-size:12px;
    line-height:1.2;
    padding:5px;
    color:#fff;
    background-color:#4a4;
}
.Pointillism_Canvas {
    display:block;
    position:relative;
    xpadding:20px;
    xleft:20px;
    xtop:20px;
    background-color:#333;
}
</style>
<script>
var points = [];
var replay = [];
var replayx = 0;
function pClearCanvas(can){
    ctx = can.getContext('2d');
    ctx.clearRect(0,0,can.width,can.height);
}
function Pointillism_1_ClearCanvas(){
    pClearCanvas(Pointillism_1_Canvas_1);
    pClearCanvas(Pointillism_1_Canvas_2);
}
function PointsReset(){
    points = [];
    replay = [];
    inRepeat = false;
    inReplay = false;
    Pointillism_1_ClearCanvas();
}
function Pointillism_1_ResetCanvas(){
    PointsReset();
    if( Pointillism_1_Share.checked ){
        //alert('---broad cast reset\n');
        GJ_BcastMessage('DRAW RESET');
    }
}
function Pointillism_1_ResetCanvasReceive(){
    //alert('---received reset\n');
    PointsReset();
}
function drawPoint(can,x,y,r,g,b){
    const ctx = can.getContext('2d');
    ctx.fillStyle = 'rgba('+r+','+g+','+b+',0.7)';
    ctx.fillRect(x,y,8,8);
}
function waitMs(serno,ms){
    console.log('-- wait #'+serno+' '+ms+'ms');
    until = new Date();
    now = until.getTime();
    untilMs = now + ms;
    for( wi = 0; ; wi++ ){
        now = new Date();
        nowMs = now.getTime();
        remMs = untilMs - nowMs;
        //console.log('wait '+wi+': '+remMs+'/'+ms);
        if( remMs < 0 ){
            break;
        }
    }
}
var inReplay = false;
function replay1(){
    rx = replayx;
    if( replay.length <= rx ){
        return;
    }
```

```
    replayx += 1;
    p1 = replay[rx];
    if( p1[1] == 1 ){
        can = Pointillism_1_Canvas_1;
    }else{
        can = Pointillism_1_Canvas_2;
    }
    drawPoint(can,p1[2],p1[3],p1[4],p1[5],p1[6]);
    if( inReplay == false ){
        console.log('wait '+replayx+' Stopped');
        return;
    }
    if( rx < replay.length-1 ){
        prevMs = replay[rx][0].getTime();
        nextMs = replay[rx+1][0].getTime();
        delayMs = nextMs - prevMs;
        //console.log('wait '+replayx+' '+delayMs+'ms');
        window.setTimeout(replay1,delayMs);
    }else{
        console.log('wait '+replayx+' Finished');
        if( inRepeat ){
            window.setTimeout(repeat1,1000);
        }
    }
}
function Pointillism_1_ReplayCanvas(can){
    Pointillism_1_ClearCanvas();
    replay = points;
    replayx = 0;
    inReplay = true;
    replay1();
}
var inRepeat = false;
function repeat1(){
    Pointillism_1_ClearCanvas();
    replay = points;
    replayx = 0;
    replay1();
    if( inRepeat ){
        //window.setTimeout(repeat1,1000);
    }
}
function Pointillism_1_RepeatCanvas(can){
    if( inRepeat ){
        inRepeat = false;
        inReplay = false;
    }else{
        inRepeat = true;
        inReplay = true;
        repeat1();
    }
}

function CopyLocal(){ return Pointillism_1_Share.checked == false; }
function Pointillism_Setup(){
    var moveCount1 = 0;
    var moveCount2 = 0;

    var gjlinked = false;
    function GJdraw(msg){
        if( gjlinked == false ){
            //GJLink_Section.open = true;
            GJ_Join();
            gjlinked = true;
        }
        GJ_BcastMessage('DRAW '+msg);
    }
    function showXY1(e){
        moveCount1 += 1;
        x = e.offsetX;
        y = e.offsetY;
        Pointillism_1_XY_1.innerHTML = 'XY1: '+ 'x='+x +', y='+y +' /'+moveCount1+'/'+points.length;
        Pointillism_1_XY_2_Remote.innerHTML = 'XY1: '+ 'x='+x +', y='+y +' /'+moveCount1;
        if( e.buttons || CopyLocal() ){
            points.push([new Date(),1,x,y,64,64,255]);
            drawPoint(Pointillism_1_Canvas_1,x,y,128,128,255);
            if( CopyLocal() ){
                drawPoint(Pointillism_1_Canvas_2,x,y,160,160,255);
            }
            GJdraw('1,'+x+','+y);
        }
    }
    function showXY2(e){
        moveCount2 += 1;
        x = e.offsetX;
        y = e.offsetY;
        Pointillism_1_XY_2.innerHTML = 'XY2: '+ 'x='+x +', y='+y +' /'+moveCount2+'/'+points.length;
        Pointillism_1_XY_1_Remote.innerHTML = 'XY2: '+ 'x='+x +', y='+y +' /'+moveCount1;
        if( e.buttons || CopyLocal() ){
            points.push([new Date(),2,x,y,64,255,64]);
            drawPoint(Pointillism_1_Canvas_2,x,y,128,255,128);
            if( CopyLocal() ){
                drawPoint(Pointillism_1_Canvas_1,x,y,160,255,160);
                //GJdraw('2,'+x+','+y);
            }
        }
    }
    Pointillism_1_Canvas_1.addEventListener('mousemove',showXY1);
    Pointillism_1_Canvas_2.addEventListener('mousemove',showXY2);
    Pointillism_1_Unit_2.style.left = '340px';
    Pointillism_1_Unit_2.style.top = '-375px';
}
function Pointillism_RemoteDraw(arg){
    //alert('Draw at '+arg);
    //drawPoint(Pointillism_1_Canvas_2,x,y,160,160,255);
    if( arg == 'RESET' ){
        Pointillism_1_ResetCanvasReceive();
    }else{
        argv = arg.split(',');
        x = argv[1];
        y = argv[2];
        Pointillism_1_XY_2_Remote.innerHTML = 'XYR: '+ 'x='+x +', y='+y +' /'+points.length;
        drawPoint(Pointillism_1_Canvas_2,x,y,255,0,0);
    }
}
</script>


<input id="Pointillism_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="Pointillism_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="Pointillism_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<span id="Pointillism_WorkCodeView"></span>
<script id="Pointillism_WorkScript">
function Pointillism_openWorkCodeView(){
    function Pointillism_showWorkCode(){
        showHtmlCode(Pointillism_WorkCodeView,Pointillism_WorkCodeSpan);
    }
    Pointillism_WorkCodeViewOpen.addEventListener('click',Pointillism_showWorkCode);
}
Pointillism_openWorkCodeView(); /// should be invoked by an event
</script>
</details>
<!-- Pointillism_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//<!-- ========== Work { ========== -->
//<span id="StatCounter_WorkCodeSpan">
/*
<details open=""><summary>StatCounter</summary>
<!-- ---------- StatCounter// 2020-1018 SatoxITS { -->
<h2>StatCounter</h2>

<div class="statcounter"><a title="hit counter" href="https://statcounter.com/" target="_blank"><img class="statcounter" src="https://c.statcounter.com/12411639/0/1aeb2a3a/0/" alt="hit counter"></a>
 (counter as image tag)</div>
<style>
.statcounter {
    vertical-align:middle;
}
#sc_SatoxITS {
    color:#000;
    font-size:12pt;
    height:30px;
    width:100%;
    background-color:#ddd;
}
</style>

<div>
<script>
```

```
    var sc_project=12411639;
    var sc_invisible=0;
    var sc_security="1aeb2a3a";
    var sc_https=1;
    var scJsHost = "https://";
</script>
<!-- script src="https://statcounter.com/counter/counter.js" -->
<!-- /script ---> (counter by inline script)
</div>

<input id="StatCounter_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="StatCounter_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="StatCounter_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">

<span id="StatCounter_WorkCodeView"></span>
<script id="StatCounter_WorkScript">
function StatCounter_openWorkCodeView(){
    function StatCounter_showWorkCode(){
        showHtmlCode(StatCounter_WorkCodeView,StatCounter_WorkCodeSpan);
    }
    StatCounter_WorkCodeViewOpen.addEventListener('click',StatCounter_showWorkCode);
}
StatCounter_openWorkCodeView(); /// should be invoked by an event
</script>

</details>
<!-- StatCounter_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//<!-- ========== Work { ========== -->
//<span id="Template_WorkCodeSpan">
/*
<details><summary>Work Template</summary>
<!-- ---------- Template of Work// 2020-0928 SatoxITS { -->
<h2>Template of Work</h2>
<input id="Template_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="Template_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="Template_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<span id="Template_WorkCodeView"></span>
<script id="Template_WorkScript">
function Template_openWorkCodeView(){
    function Template_showWorkCode(){
        showHtmlCode(Template_WorkCodeView,Template_WorkCodeSpan);
    }
    Template_WorkCodeViewOpen.addEventListener('click',Template_showWorkCode);
}
Template_openWorkCodeView(); /// should be invoked by an event
</script>
</details>
<!-- Template_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//<!-- ========== Work { ========== -->
//<span id="OriginalSource_WorkCodeSpan">
/*
<details open=""><summary>Original Source</summary>
<!-- ---------- OriginalSource // 2020-1009 SatoxITS { -->
<h2>Original Source of GShell</h2>
<input id="OriginalSource_WorkCodeViewOpen" class="HtmlCodeViewButton" type="button" value="ShowCode">
<input id="OriginalSource_WorkOpenSnapshot" class="HtmlCodeViewButton" type="button" value="Snapshot">
<input id="OriginalSource_WorkCodeSignature" class="HtmlCodeViewButton" type="button" value="Signature">
<span id="OriginalSourceTextElement"></span>
<span id="OriginalSource_WorkCodeView"></span>
<script id="OriginalSource_WorkScript">
function OriginalSource_openWorkCodeView(){
    function OriginalSource_showWorkCode(){
        //showHtmlCode(OriginalSource_WorkCodeView,OriginalSource_WorkCodeSpan);
        //OriginalSourceTextElement = OriginalSourceNode;
        //console.log('src3=\n'+OriginalSourceNode.outerHTML);
        showHtmlCodeX(OriginalSource_WorkCodeView,OriginalSourceNode,
            '/*\n',
            '\n',true);
    }
    OriginalSource_WorkCodeViewOpen.addEventListener('click',OriginalSource_showWorkCode);
}
//OriginalSourceNode = document.documentElement.cloneNode();
//OriginalSourceNode = gsh.cloneNode(true); //======================
        //console.log('src0=\n'+document.documentElement.outerHTML);
        //console.log('src1=\n'+gsh.outerHTML);
        //console.log('src2=\n'+OriginalSourceNode.innerHTML);
OriginalSource_openWorkCodeView(); /// should be invoked by an event
        //showNodeAsHtmlSource(OriginalSource_WorkCodeView,OriginalSourceNode);
function SaveOriginalNode(){
    if( false ){
        m0 = performance.memory;
        mu0 = m0.usedJSHeapSize;
        console.log('-- heap bef clone: '
            +m0.usedJSHeapSize+'/'+m0.totalHeapSize+'/'+m0.jsHeapSizeLimit);
    }
    OriginalSourceNode = gsh.cloneNode(true);
    if( false ){
        m1 = performance.memory;
        mu1 = m1.usedJSHeapSize;
        mu = mu1 - mu0;
        //alert('-- clone: used heap '+mu0+' -> '+mu1+' = '+mu+' bytes');
        console.log('-- heap aft clone: '
            +m1.usedJSHeapSize+'/'+m1.totalHeapSize+'/'+m1.jsHeapSizeLimit);
        //OriginalSourceNode = document.documentElement.cloneNode(true);
    }
}

function Gsh_setupPage(){
    GshSetImages();
    //Indexer_afterLoaded();
        //GShell_initKeyCommands();
        //GJConsole_initConsole();
    GJConsole_initFactory();
    GJLink_init();
    InterFrameComm_init();
    Gshell_initTopbar();
    //WirtualDesktop_init();
    Banner_init();
//  Aff_Setup();
    Shading_Setup();
    window.setInterval(ShowResourceUsage,1000);
    //document.addEventListener('keydown',jgshCommand); // should be applied later?
    Pointillism_Setup();
    FontList_Setup();
        showFooter();
        GshInsideIconSetup();
}
function OnLoad(){
    SaveOriginalNode();
    Gsh_setupPage();
}
document.addEventListener('load',Gsh_setupPage);
</script>
</details>
<!-- OriginalSource_WorkCodeSpan } -->
*/ //</span>
//<!-- ========== Work } ========== -->


//</div>
//<br><script>OnLoad();</script></span>
```