

# A2 user guide and applications description

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## What is A2?

A2 is the name of an an operating system and an integrated software environment developed at ETH in Zürich. It is a single-user, multi-core, multi-tasking system that runs on bare hardware or on top of a host operating system.

The developers aim at producing a reliable, real-time operating system suitable for embedded systems and for industrial and in particular medical applications.

Earlier, A2 was called “Aos” (Active Object System), a nomenclature that is still in use. It is written in the Active Oberon programming language, which evolved from Oberon, a programming language in the Pascal/Modula tradition. The graphical user interface is referred to as “Bluebottle”.

These inter-related web sites provide introductory information:

1. Bluebottle [www.bluebottle.ethz.ch](http://www.bluebottle.ethz.ch) the starting point
2. Oberon Community platform [www.ocp.inf.ethz.ch](http://www.ocp.inf.ethz.ch) with a wiki and a user forum
3. Oberon [www.oberon.ethz.ch](http://www.oberon.ethz.ch) original site of the ETH Oberon

After having started A2, Tutorial.Text is a concentrated user guide to be used as a quick reference.

## Document structure

This document presents some of the A2 applications (further ones will be added as time goes) where each application is summarized in a table, aiming at being sufficiently informative, simple, compact and uniform across all applications.

The production of the A2 deliverables, described later as “builds”, is conducted by a script stored in the Release.Tool file, which serves as input to the central Release.Mod program. Therefore, it seemed appropriate to write this documentation based on two well recognizable sections, called “packages”, of the Release.Tool text, namely “GuiApplicationsMini” and “GuiApplications” responsible for compiling the applications documented here.

Many passages of this text are either extracted or adapted from Thomas Frey's authoritative Ph.D. thesis

Bluebottle: A Thread-safe Multimedia and GUI Framework for Active Oberon

<http://e-collection.ethbib.ethz.ch/eserv/eth:27966/eth-27966-01.pdf> - Abstract

<http://e-collection.ethbib.ethz.ch/eserv/eth:27966/eth-27966-02.pdf> - Full text

A reader should be aware that A2 has still evolved since its inception (2000-2005).

The table documenting an application has the following structure:

<b>Usage</b>	Purpose, concise description and general behavior of the application which manifests itself often as a window inserted on the desktop. A number of applications without GUI are also described, usually supporting a GUI application. These applications are then controlled exclusively by commands. An expert user can dispense with the GUI and commands can be conveniently batched.
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<b>Start</b>	<p>Lists the command which starts the application and possibly a few more commands providing additional functionality.</p> <p>Since the mouse is the input device for controlling a GUI, the following conventional abbreviations are defined:</p> <table border="1"> <tr> <td>ML</td><td>Left mouse button</td></tr> <tr> <td>MM</td><td>Middle mouse button</td></tr> <tr> <td>MR</td><td>Right mouse button</td></tr> </table> <p>These apply to a 3-button mouse which is best suited to control A2. In the following it is shown how to use a 2-button mouse in combination with keyboard keys. A keyboard key is then used as a substitute for MM.</p> <p><b>Shortcut:</b> Main menu → .. → .. the path to follow for starting the application.</p>	ML	Left mouse button	MM	Middle mouse button	MR	Right mouse button
ML	Left mouse button						
MM	Middle mouse button						
MR	Right mouse button						
<b>Stop</b>	<p>How to stop the application. For a GUI application, it suffices to close the window. None of the object module involved is then unloaded.</p> <p>Also, how to unload the top level modules involved, thereby closing all similar windows, if any. When more than one module is participating in the application, the modules are listed in the order in which to unload them orderly, that is, the top module comes first. The order in which to compile then is exactly the reverse.</p> <p>A shorter method for unloading several modules is to use SystemTools.FreeDownTo moduleName ~. This command frees all the indirectly imported modules, although this is somewhat dangerous.</p>						
<b>Restorable</b>	<p>This table entry appears only when the GUI application is restorable to the desktop: the application module was then programmed to be such.</p> <p>If the user saves the desktop (a button on the Main menu is provided), data on the current state of the application is recorded for use in the next session. When A2 is started anew, the application window will reappear on the desktop in the state and at the location it had during the previous session.</p> <p>More detail is provided in the section “Desktop save/restore mechanism”.</p>						
<b>Build</b>	<p>This table entry appears only when the application is not available/portable to a specified build.</p> <p>Example: WMUsblInfo is not portable to WinAos since USB devices are controlled by the host.</p>						
<b>Data files</b>	<p>When applicable, data files supporting the application are listed. Some of them contain icons or images allowing some customization of the GUI.</p>						

A number of application descriptions are supplemented with screen shots previewing what a user is expected to see on a live A2 system. Each image is followed by a screen shot command line used to capture it. Most were obtained using a WinAos system.

## Run A2 from a live CD

Now is the time to start A2 and to practice with it. A2 need not be installed. Instead, booting from a CD-ROM, A2 will not interfere with the resident operating system and a user will play safe. However, do not mount a FAT file system and play with it while controlling A2, unless it is done purposely. Insert a live CD-ROM created from the ISO CD-image (see section “Packages, Release builds and Ports) and boot a PC from it, using the boot menu. A2 is customized in such a way that the odds are good for a correct start. The hardware equipment of the machine will be inspected and the available drivers will be installed automatically.

In the case of failure, seek help in the “Installation” text of the Oberon Community Platform:

## Desktop

When A2 starts, the screen presents the Main menu (documented in a follow-up section) and a number of windows depending on how the system is customized and depending on the number of restorable applications that were active when the desktop was stored in an earlier session. In case A2 is started from a live CD, as suggested above, customization is hardly an option and none of the changes will be persistent.

### Virtual desktop

The desktop is more than just the screen area. It extends well beyond the physical boundary of the screen which is only the visible part of a conceptually unlimited two-dimensional *display space* in which an arbitrary number of *windows* and other arbitrarily shaped objects can be situated. In the practical implementation, the display space is limited to the range of 32-bit signed integers for the number of pixels. This display space, call it “*virtual desktop*”, can be viewed as:

- either as a conceptual raster of screen-sized areas. The units of the rectangular coordinates system are the screen width and height. The coordinates of screen-sized areas are relative to “standard view port”.  
When A2 is started, the top left corner of the screen represents the origin of the coordinates and the “standard view port” is visible.

-1, -1	0, -1	1, -1
-1, 0	0, 0 Standard view port	1, 0

- or a pixels raster. The units of the rectangular coordinates system are pixels. The coordinates of a point in space are relative to the top left corner of the screen.

All desktop areas can be made visible by navigating in the desktop as described below.

### View port

A view port is the portion of a rectangular area of the display space made visible on the screen. Such a rectangular area is addressable either pixel-wise, as will be explained below, or by the coordinates of screen-sized rectangles, as used in some applications.

### Desktop navigation (generic)

Here, the concept of view port is used without reference to the screen-sized raster. A view port can be moved and resized/scaled by *repeating the actions* described next.

To move the view port, press the meta key and move the mouse or one of the direction keys as follows:

<b>Meta+Mouse Move (1)</b>	The view port observes the mouse pointer and if the cursor reaches the
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	screen border, the visible view port disappears progressively in the opposite direction of the mouse movement and is replaced pixel-wise by the neighboring view port.
<b>Meta+Left</b>	Display the view port at the left.
<b>Meta+Right</b>	Display the view port at the right.
<b>Meta+Up</b>	Display the view port on top.
<b>Meta+Down</b>	Display the view port below.

To resize the view port, press the meta key and turn the mouse wheel up or down or press another key as follows:

<b>Meta+Mouse Wheel (2)</b>	Zoom desktop in & out, by a factor of 0.4, keeping the screen center in position. Remark: not all wheel notches cause resizing. (cannot explain) The alternative to a mouse wheel is to use PageUp or PageDown.
<b>Meta+PageUp</b>	Zoom in 2x, keeping the screen center in position. For a finer grain zooming, use the mouse wheel.
<b>Meta+PageDown</b>	Zoom out 2x, keeping the screen center in position. For a finer grain zooming, use the mouse wheel.
<b>Meta+Home</b>	By an adequate zooming and movement of the view port the used portion of the desktop becomes visible, so as to get an overview of the entire desktop. Useful in case of being lost, to smoothly “motor” zoom into an overview of all windows. A follow-up action could be Meta+ML on a window (see below). Alternatively, use the command WMNavigator.Open ~.
<b>Meta+End</b>	Set the zoom factor to 1, keeping the screen center in position..
<b>Meta+ML on window</b>	Select a window of interest with a ML click. The view port moves so that the window is placed at the top left. If it fits to the screen, the zoom factor is set to 1 so that the window is visible without scaling. Otherwise, the zoom factor is adjusted so that the entire window is visible.

In all situations the Main menu stays at the bottom left of the screen. In case it is hidden by window(s) placed on top of it:

<b>Meta+Esc</b>	Summon the Main menu on top.
-----------------	------------------------------

Key equivalences:

<b>Meta</b>	<b>Alt-Shift</b> , but in WinAos not for (1) and (2)
<b>Meta</b>	<b>Menu</b> in WinAos

## Windows



[ WMScreenShot.SnapShotRange text.bmp 300 60 0 0 ~ ]

Windows are decorated with four special frame objects, one for the title, two for the sides and one for the bottom. These frame objects offer a meta area that allows the user to manipulate the window in the display space by responding to pointer events. They serve as handles to move, resize and change the z-order (overlapping) of windows. The title includes, at the left, an icon symbolizing the window function, a descriptive text and, at the right, a hot-spot (bullet) for closing the window with a ML, MM or MR click. Two sets of images and colors are used for the frames: one set for the *active window*, the other set for inactive windows. The look of windows, such as the shape of frame objects, the color of buttons, the shape of cursors is implemented in skins (see Skin loader). At any time, there is only one active window, the window in focus with its title and sides that glow brighter.

Even though the A2 metaphor with its large virtual desktop suggests to spread application windows instead of stacking them on top of each other, it is still important for the work-flow to support overlapping. The management of overlapping differs from other window managers.

When the pointer is located on:

1. the border (one of the frame objects) of an inactive window, a MM or ML click activates the window but does not cause it to move to the front (does not change the overlapping). This prevents hiding the information contained in a window placed on top of the clicked window. A double click is needed to move it to the front. A feedback is given by the brighter border.
2. on a window border, pressing the MM or ML key and dragging causes a window resizing. The border is moved and when the pointer is on a corner two borders are moved (the cursor shape reveals what reshaping to expect). Release the key to end reshaping.
3. the window title, pressing the MM or ML key and dragging causes the window to move within the display area. The cursor takes the shape of a cross with 4 arrows. When the cursor reaches a display border, a portion of the window may have disappeared in neighboring view port(s). Release the key to end.

The presence of frame objects is conditioned by the program instantiating a window. The information appearing in the title frame is also conditioned by the same window constructor program. Two examples appear in the title frame:

1. the window icon symbolizing the window type situated at the left. It, and all other similar window icons, is extracted from the icon collection WMLcons.tar (an archive of .png images). If someone wants to get rid of the window icons, it suffices to rename or to delete this file. It is thus also possible to adopt other symbolic icons. Window icons are used by the Virtual desktop navigation (refer to that section).
2. the plain text title appearing to the right of that icon. This text is hard-coded.

Unframed windows are rare but then an artifact, such as providing a “Close” command in a pop-up menu, is needed. WMClock and WMCalendar are examples.

These are the basics of the desktop navigation. Applications facilitating navigation are described further on.

## **Colors and transparency**

A2 uses colors extensively either solid or semi-transparent. Colors are stored as RGBA

values (red, green, blue and alpha components). The additional alpha channel determines to what level a color is solid or semi-transparent, an alpha channel value of:

- 0 meaning “completely transparent”
- 255 meaning “solid”.

The normal case is that colors are defined in programs but there exist a few applications where the user is responsible for assigning such values, e.g. Menu page generator.

## Commands control A2

A user controls A2 with commands. A *command* is, by construction and by convention, an exported procedure in a module written in the programming language *Active Oberon* with the purpose of doing some processing and to change the system state. A *CommandName* is a qualified identifier composed of a *ModuleName* and of the *ProcedureName* of a procedure exported by the module. The command name is then said *valid*. Commands also have a need for an input mechanism. For example, PET.Open which denotes the exported procedure Open from the module PET (Programmer's Editing Tool) must be told which file to load from disk. Commands which perform computations are typically parameterized by a number of variables which must be initialized prior to each run.

Note that the parameters are not the parameters of the procedure represented by CommandName.

Formal definition of a command:

```
Command = CommandName [Parameters] ["~"]
CommandName = ModuleName "." [ ProcedureName ]
Parameters = {Separator} AnyChar
Separator = " " | TAB | CR | LF           Also called "WhiteSpace"
AnyChar = { 0X..FFX except "~" }
```

The following conditions apply:

```
ModuleName and ProcedureName are case-sensitive
LEN(ModuleName) <= 32 , defined by Modules.Name
LEN(CommandName) <= 256 , defined WMTextView.MaxCommandLength
LEN(Parameters) <= 1024*1024 , defined by WMTextView.MaxCallParameterBuf
```

The parameters are often input or output file names or represent options conditioning the command execution. Parameters are parsed by the command interpreter. The command parser, by convention and by construction, expects to find the options at the beginning of the parameter list.

Parameter information is taken from the text which follows the CommandName, that is from the context. Example: PET.Open Configuration.XML ~

If “^” appears on its own in the context it is also considered as a parameter and interpreted as a pointer to a selected text stretch in some other context. Each text editor may contain a selected text stretch or *selection* (see section “Editing with the mouse”) but a “^” refers only to the *most recent selection*.

The selection is used as a parameter in two ways:

1. The selection contains a name (or list of names) designating objects to be processed. In this case, the selected stretch may be viewed as an extension of the text following CommandName.  
Example: PET.Open ^ ~ where Configuration.XML is selected in some other editor present on the desktop.
2. The selection is the object of the command and is changed or otherwise processed. Take WMTextTool.CountLines ^ ~ for example, which count the number of lines of the selected text stretch.

The command options used in numerous commands are processed by Options.Mod designed to obey to the following syntax:

```
Options      = "-" Option {Separator "-" Option}      (1)
Option       = CharOption | "-" NameOption            (2)
CharOption   = Flags | Char Assignment                (3)
Flags        = Char {Char}                            (3)
NameOption   = Name [Assignment]                      (4)
Assignment   = "=" (Integer | String)                  (5)
Char         = (32<ORD (CHAR)<127) & (CHAR # "=")
```

These definitions are commented and exemplified:

1. More than one Option may be specified and each one is announced by "-".  
*-i -o -s are three options*
2. An Option is specified using a short CharOption or using the more verbose "--" NameOption  
*-h, --help are equivalent and so are -v, --verbose – All 4 are Flags.*
3. A CharOption may:
  - a) be a single Char, then called Flag, or multiple agglutinated Flags  
*-ios is equivalent to -i -o -s*
  - b) take an argument using "=" to assign a value (see 5)
4. A NameOption may take an argument using "=" to assign a value (see 5)
5. The assigned value may be an Integer or a String (possibly in quotes)  
*--prefix=CD: or -i=49H*

All this seems a little complicated but the single flag CharOption is encountered most frequently. ZipTool uses a larger palette of command options derived from the above syntax. More on the subject in

<http://www.ocp.inf.ethz.ch/wiki/Documentation/Miscellaneous#toc2>

including an example parser program.

An earlier form of command option, using a "\", still exists in modules left unrevised.

It is recommended to terminate a command with a "~" because when omitted, all the characters of *Parameters* up to the end of text (limited by MaxCallParameterBuf) will be copied to the parameter buffer, thereby consuming a lot of memory and execution time.

Example of command:

PET.Open -e PET.Mod Configuration.XML ~

opens two files in a new window external to the window where the command appears. In the option "-e", "e" stands for "external".

A *command execution* is triggered:

- a) either directly by typing a command in an open text editor, such as PET, the Notepad or the Kernel log, then positioning the cursor on the command name and finally clicking MM (or Ctrl+ML for a 2-button mouse). Instead of using the mouse, one can use the keyboard, holding down Ctrl and pressing Enter. Mouse and keyboard *events* are detected and interpreted by a listening program called *command interpreter* in charge of executing the command procedure,
- b) or indirectly by a program designed to parse some text, to retrieve a precise command and finally to execute the selected command. This technique is used by the customization described next, in menus and by HotKeys,
- c) or using the context sensitive PieMenu opened by pressing MR in text editor.

More details on this subject in: [www.ocp.inf.ethz.ch/wiki/Documentation/Miscellaneous](http://www.ocp.inf.ethz.ch/wiki/Documentation/Miscellaneous) and a programming explanation of command in: A2 Programming Quickstart Guide [www.ocp.inf.ethz.ch/wiki/Documentation/Language?action=download&upname=A2QuickStartGuide.pdf](http://www.ocp.inf.ethz.ch/wiki/Documentation/Language?action=download&upname=A2QuickStartGuide.pdf)

A command designed to open a window on the desktop will usually have “Open” as procedure name, but that is only a good practice convention and is consistent with the intention of opening a GUI application.

When a command fails to execute, an error message is sent to the Kernel log or a suitable context (*to be defined better*). This is the case when the *CommandName* is not valid . When only *ModuleName* is valid, the module is loaded anyway. Other errors may be detected during the parsing of parameters. It is thus recommended to have the Log open on the desktop and to keep an eye on it to watch how work is progressing.

When a command execution fails completely, without even the possibility to issue an error message, a TRAP window with a red background informs about the location (pc = program counter) of the failing program statement.

## The command interface

In A2, commands can be placed within *any text* and command execution is invoked as described above. This paradigm, called TUI (Textual User Interface) has several advantages over Command Language Interfaces (CLIs):

**Visibility** Commands and their parameters can be placed into *tool texts* prepared for a specific task or set of tasks. The commands are visible in the text and ready to be invoked by the user.

**Readability** There is no need for commands to be short and cryptic since commands are normally not typed very often. Normally, commands are typed only once for a specific task. If there is a chance to need the command again for the same or a similar task , the respective text can simply be stored as a tool text for reuse.

A good example is given by the scratch text area of the PET.

In CLIs in contrast, commands and parameters must be remembered or looked up before

use. Shells are well-known representatives of CLIs, which offer a line editor where the user can type and modify the command line that is then interpreted according to the rules of the command line interpreter when the user presses the Enter key. Three shell applications are available in A2.

## Customization of A2

*Customization* is the task of placing commands at strategic points on the system's evolution path through a cascade of state changes, beginning at the system start, and to finally establish the best possible initial state from the user's point of view. In contrast, a downloadable A2 release is customized to have the best chance to be successfully installed on a machine of unknown hardware composition. Experience helping, one may assert that, by and large, a freshly installed system is already well customized and needs little adjustments and if so for two major reasons:

1. in the case that an A2 *build* fails to start from its CD-ROM, a customization is needed to circumvent the difficulties experienced by adjusting the “best guess defaults” defined in the build process. The configuration data is then of concern.
2. in the case that an A2 build effectively runs from the start and can thereafter be installed, the customization serves the purpose of adjusting A2 to personal requirements evaluated in terms of ease of use, applications readiness and presentation.

From the start of a session the system state is conditioned by persistent data, essentially some text with embedded commands, located in:

1. the *configuration data* exploited by and controlling the *boot loader*. Detailed information of the subject is found at:  
[www.ocp.inf.ethz.ch/wiki/Documentation/Configuration](http://www.ocp.inf.ethz.ch/wiki/Documentation/Configuration)  
WinAos uses configuration data located in aos.ini which is different because the hardware is controlled by the Windows host. A user's preference may also be stored in myaos.ini which is given the priority over aos.ini (the latter may then be left unaltered for safety).
2. the file Configuration.XML with an important Autostart section
3. commands embedded in data files, mostly with names suffixed .XML
4. commands embedded in the Main menu and its sub-menus

and optionally, whenever deemed useful:

5. commands embedded in HotKeys.XML (see section “HotKeys”)
6. commands embedded in the Auto.dsk file (see section “Desktop save/restore”)
7. commands listed as parameters of the system command  
SystemTools.DoCommands (see section “SystemTools”).

The duty of the commands is manifold such as: inspect the hardware, install drivers, mount/unmount partitions, start and control applications. Quite a number of them are described in what follows.

Items 1. and 2. are imperatively evaluated in that order on the evolution path, while the data conditioning the remaining items will not necessarily be exploited in its entirety. The persistent data must in most cases be maintained by the user with the help of a text editor. On the contrary, item 6. is constructed by the system when the user requests to save the

desktop for a subsequent session. Item 7 uses a mechanism which is in fact much more general than suggested here for customizing the system.

From the previous enumeration one can deduce that the strategy for placing commands is not obvious and is a matter to be dealt with by the user. The following explanations should facilitate deciding on where about to insert the commands mentioned in the context of the many application descriptions.

## **Configuration.XML**

An A2 build is conditioned in many ways by the Configuration.XML file. This file is a structure of nested sections:

```
<?xml version="1.0" encoding="UTF-8" standalone='yes'?>

<!-- Aos configuration -->
  <Config>
    <Section name="A">
      <Section name="B">
        <Section name="C">
          <Setting name="D" value="Hello world"/>
        </Section>
      </Section>
    </Section>
  </Config>
```

with sections and sub-section for specifying such things as: localization, supported file systems, autostart commands located in the Autostart section, codecs, etc.

The file is part of the A2 delivery. Whenever a modification is desired or needed:

1. edit the configuration text with, for example, Notepad.OpenAscii Configuration.XML ~ (see Text editor).  
**Shortcut:** Main menu → System → Configuration
2. save the configuration, and
3. execute Configuration.Init ~ to finalize the change.

If the modified configuration is syntactically correct, A2 may be restarted and the new configuration applies. If a syntax error is detected in step 3, the faulty configuration is ignored and the stand-by, shadow copy, correct configuration Save.Configuration.XML is used instead. In this way, the next A2 start can succeed. Starting with corrupted specifications might be fatal, meaning that A2 might fail to start altogether.

## **Autostart section**

Among all the sections, the *Autostart section* is of particular interest to the user as it collects system commands that the user may want to let execute automatically when A2 starts. Here is an example Autostart section including three commands:

```
<Section name="Autostart">
  .....
  <Setting name="Start the main menu" value="StartMenu.Open"/>
  <Setting name="DefaultSkin" value="SkinEngine.Load stijnbw.skin"/>
  <Setting name="Restore the desktop" value="WMRestorable.Load Auto.dsk"/>
```

</Section>

These commands, together with a great many other commands, are described at length in the remaining part of this text. The “StartMenu.Open” command is almost always included to let the Main menu appear at start-up.

## Desktop description

### Main menu

It offers to select and to start an application with simple ML clicks. Behind the scene, an A2 command is executed that a user would have to enter otherwise via the keyboard. These commands are documented in the application descriptions in the remaining of this text. The menu collects some of the most used or representative GUI applications organized in a two-level hierarchy of buttons.

Note: the look of the menu, and all other windows on the desktop, varies with the skin (more on the subject in the section Skin loader). The menu shown here is programmatically generated and uses no skin.



[ WMScreenShot.SnapShotRange test.bmp 500 59 0 915 ~ ]

Each button in the top row represents a group of somewhat related applications.

A ML click on one of the buttons selects the group. On the figure “System” was selected, with a yellow background, and the applications in that group are listed in the two bottom rows. A black and white print shows it in light gray.

A ML click on an application button starts the application and a window is opened on the desktop, with few exceptions. The figure shows “Reboot” and “Shutdown” with a red background stressing their special function and meaning. A black and white print shows them in lighter gray.

<b>Usage</b>	A2 is conditioned by default to show a main menu. Since the main menu is evolving in time, the function associated with each button may vary and a user has the liberty to customize the main menu. If the menu is not visible because some windows are placed on top of it, or after some navigation, press Meta+Esc to let it appear on top. In WinAos, use Meta+Esc or Menu+Esc.
<b>Start</b>	StartMenu.Open ~ Insert the main menu at the bottom left of the desktop.  This command is inserted <i>by default</i> in the Autostart section of the Configuration.XML file of a build and is thus automatically executed when A2 is started. It is not recommended to remove it, except may be when A2 runs without a display unit, but then A2 must be controlled differently (A2 used as server for example).
<b>Stop</b>	Never (Components are: StartMenu.Mod, MainMenu.Mod)



<b>Data files</b>	MenuPagexy.XML (xy takes the values 00,10, 20, 30, 40, 50, 60, 70, 80,90, all of which are reserved for the release). The delivered XML menu files are described below. The Menu file generator allows generating custom menus. The StartMenu.Open command automatically detects the presence of such menus provided it is correctly named.
-------------------	---

## Menu page structure

It is useful to know the menu structure for making small changes to existing menu pages. Complete menu pages are best created with the “Menu page generator” described further on.

An XML menu file defines a menu as a hierarchy of Panels with 2 vertically aligned Buttons, each associated with a command. The text in *italic* is the essential part that is customized.

```

<Panel caption="menuName">
  <Properties>
    <FillColor>0</FillColor>
  </Properties>
  <Panel>
    <Properties>
      <Alignment>1</Alignment>
      <Bounds>
        <Width>120</Width>
      </Bounds>
    </Properties>
    <Button>
      <Properties>
        <Caption>buttonCaption</Caption>
        <Alignment>2</Alignment>
        <OnClickHandler>X Run</OnClickHandler>
      </Properties>

      <SystemCommand>
        <Properties>
          <ID>X</ID>
          <CommandString>command</CommandString>
        </Properties>
      </SystemCommand>
    </Button>
    <Button>
      a second button definition
    </Button>
  </Panel>
  as many panels with 2 Buttons each as needed
</Panel>

```

## Desktop save/restore

<b>Usage</b>	The desktop with <i>most</i> of the task windows and backdrops (a variant of task window) can be saved at any time during a session and restored later on at will. Data on the state of the GUI applications is then (normally) recorded in Auto.dsk. When A2 is started anew, the desktop is restored to the state it had during the previous session with most but not all of the windows at the same location. The user can proceed with work as it stood earlier.
--------------	---

	<p>Saving the desktop differs from hibernation as known from other systems in that application programs are explicitly asked to store their relevant persistent data. This is much more flexible and robust than loading back an entire system memory image. It is for example possible to update the entire system or even change the hardware setup of the computer and still continue working with a desktop that was saved before the changes.</p> <p>This default behavior is conditioned by this setting:  <code>&lt;Setting name="Restore the desktop" value="WMRestorable.Load Auto.dsk"/&gt;</code>  in the Autostart section of Configuration.XML.</p> <p>Each program responsible for instantiating a GUI window must be programmed to be “restorable”. Technically, a program must include an exported procedure <code>Restore</code> that will be invoked by <code>WMRestorable.Load</code>. The table documenting an application then includes a <b>Restorable</b> entry.</p> <p>An A2 release always includes a model file called <code>Release.Auto.dsk</code> storing the same data as <code>Auto.dsk</code> as delivered with a build.</p>
<b>Start</b>	<p><code>WMRestorable.Store fileName ~</code> Store the desktop in the named file. <code>Auto.dsk</code> is the normal repository which is included in a build.</p> <p><code>WMRestorable.Load fileName ~</code> Restore the desktop from the named file.</p> <p><b>Shortcut:</b> Main menu → System → SaveDesktop  The shortcut saves slightly more data than the <code>Store</code> command does: the current skin is also recorded by executing a command <code>SkinEngine.SetCurrentAsDefault ~</code> behind the scene. Assuming that the user had loaded a skin during the session, the same look will reappear at the next start.</p>
<b>Stop</b>	Never
<b>Data files</b>	<code>Release.Auto.dsk</code> , <code>Auto.dsk</code>

## Editors and font services

The *system-wide* font name, size (in points) and style (normal, bold, italic) of text appearing in GUI components is determined by the section “WindowManager” in Configuration.XML:

```
<Section name="WindowManager">
  <Section name="FontManager">
    < Section name="DefaultFont">
      <Setting name="Name" value="VeraBd"/>
      <Setting name="Size" value="12"/>
    </Section>
    ...
  </Section>
```

An A2 build is conditioned to use the “Oberon” font of size 12. Whenever a different font, size or style is preferred, edit Configuration.XML as described earlier. This lets customize the appearance of text in window titles, button captions, dialog boxes, list entries, editors, etc.

The font name, size and style must be chosen among the available font files which can be internalized by the font loaders included in the release. A2 supports Unicode TTF fonts: simply copy a TTF file in a suitable directory to install it. Picking a font size larger than 12 will cause bits of text to be clipped in many places as A2 lacks the native ability to adjust component layouts to accommodate unusually large fonts. The current release includes font loader programs for:

Font type	Font loader
Oberon	WMOberonFonts.Mod
Bitmap (Chinese, Japanese, Korean)	WMBitmapFont.Mod
CCG	WNCCGFonts.Mod
Open type Unicode TTF (void of copyright)	WMOTFonts.Mod

The “FontLoaders” sub-section of the Configuration.XML file dictates which font loaders must be made available to the running A2 system.

```
<Section name="FontLoaders">
  <Section name="OberonFonts">
    <Setting name="Exact" value="WMOberonFonts.LoadExactFont"/>
    <Setting name="Approximate" value="WMOberonFonts.LoadApproximateFont"/>
  </Section>
  <Section name="BitmapFonts">
    <Setting name="Exact" value="WMBitmapFont.LoadExactFont"/>
    <Setting name="Approximate" value="WMBitmapFont.LoadApproximateFont"/>
  </Section>
  <Section name="CCGFonts">
    <Setting name="Exact" value="WMCCGFonts.LoadExactFont"/>
    <Setting name="Approximate" value="WMCCGFonts.LoadApproximateFont"/>
  </Section>
  <Section name="OTFonts">
    <Setting name="Exact" value="WMOTFonts.LoadExactFont"/>
    <Setting name="Approximate" value="WMOTFonts.LoadApproximateFont"/>
  </Section>
</Section>
```

When that section is missing in Configuration.XML, the system reports in the Kernel Log:

WindowManager.FontManager subsection missing in Configuration. Running on defaults  
Using embedded font

The embedded font is an Oberon font completely defined in a module WMDefaultFont and not loaded from a font file as is otherwise normal.

<b>Usage</b>	Font loader
<b>Start</b>	
<b>Stop</b>	
<b>Data files</b>	

## ***Oberon and Syntax fonts***

The Syntax typeface - [http://de.wikipedia.org/wiki/Syntax\\_\(Schriftart\)](http://de.wikipedia.org/wiki/Syntax_(Schriftart)) - was developed by Hans Eduard Meier - [http://de.wikipedia.org/wiki/Hans\\_Eduard\\_Meier](http://de.wikipedia.org/wiki/Hans_Eduard_Meier) - who later on, in collaboration with the ETH, developed the Oberon typeface specifically for the ETH Oberon system.

The Oberon typeface combines in a unique manner typical elements of antiqua and modern typefaces. Because of the large number of documents using these fonts, an Oberon font implementation of the abstract A2 font interface has been realized. The font support can load existing Oberon font files and use them in A2 outside of the Oberon

environment. For compatibility reasons, the Oberon font file format was not changed but A2 handles the font files differently in two ways:

1. To find an Oberon font, the font manager converts the given font name, size and style into the canonical font file name according to the Oberon font naming convention: the file names are made of the names listed in the tables suffixed with ".Scn.Fnt". Some fonts are available in the styles normal, bold, italic and medium bold.
2. While loading an Oberon font file, the contained metric data is converted to the Bluebottle glyph metric.

<b>Greek</b>	<b>Math</b>	<b>Oberon</b>			<b>Syntax</b>			
		Oberon8	Oberon8b	Oberon8i	Syntax8	Syntax8b	Syntax8i	Syntax8m
Greek10	Math10	Oberon10	Oberon10b	Oberon10i	Syntax10	Syntax10b	Syntax10i	Syntax10m
Greek12	Math12	Oberon12	Oberon12b	Oberon12i	Syntax12	Syntax12b	Syntax12i	Syntax12m
Greek14	Math14	Oberon14	Oberon14b	Oberon14i	Syntax14	Syntax14b	Syntax14i	Syntax14m
Greek16	Math16	Oberon16	Oberon16b	Oberon16i	Syntax16	Syntax16b	Syntax16i	Syntax16m
Greek20	Math20	Oberon20	Oberon20b	Oberon20i	Syntax20	Syntax20b	Syntax20i	Syntax20m
Greek24	Math24	Oberon24	Oberon24b	Oberon24i	Syntax24	Syntax24b	Syntax24i	Syntax24m

<b>Courier</b>	<b>Philus</b>		<b>Shanghai</b>
Courier8			Shanghai
courier10	Philus10	Philus10b	
Courier12	Philus12	Philus12b	

Bibliography: Max Caflisch. Die Entstehung der Syntax-Antiqua  
OFFICINA, Mitteilungen des Hauses Schwabe & Co., Basel, 1996.

Note: International Typeface Corp. markets another OpenType typeface called "Oberon" but quite different.

## **OpenType fonts**

OpenType is a font format defined by Microsoft and Adobe that can contain glyph outlines in the TrueType or Type I format. OpenType fonts support Unicode and can contain information for more than 65'000 characters. The names of the installed OpenType fonts can be obtained by executing: WMOTFonts.MultiTest ~ described elsewhere.

Many thousand OpenType fonts are by now available, which made the integration of the format in A2 as a font plug-in attractive. The implementation is based on the off-line TTF to Oberon font converter built by Erich Oswald at the ETH Zürich under the name OType "a package for loading and rendering TrueType fonts within the ETH Oberon system.

## **Bitmap fonts**

Their purpose is not understood. This holds also true for the exported procedure WMBitmapFont.Import which uses cjkfont.xml found nowhere, also not on the web.

## **CCG fonts - Chinese Composite Glyphs**

A software for drawing and viewing Chinese glyphs. Citing Thomas Frey's thesis:

*Traditional Open Type fonts are not very well suited to store glyphs of the group of Chinese, Japanese and Korean (CJK) languages in a space efficient way. The 60'000 most commonly used CJK glyphs require about 40MB of storage. While this size is acceptable for current desktop computers, it is by far too large for smaller devices such as PDAs or wearable computers. Making use of the highly structured composition of Chinese glyphs, it is possible to store the same number of glyphs in a file as small as about 1MB. Each Chinese glyph is either a radical or contains one or more radical-like elements. There are 214 unique radicals in traditional writing, 189 in the simplified form. Most parts of a glyph can be drawn re-using radicals in different sizes and positions. Complex glyphs can be constructed by repeated re-use of radical elements or by the recursive use of other complex glyphs. To produce aesthetic complex glyphs, several different variations of the radical are needed.*

*The Taiwan-based company eForth developed a font format and database, called CCG font, based on recursive composition of radicals and radical-like elements. The font format can store the glyphs of more than 82'000 CGK characters in a file of about 2MB. This is a sufficiently small size for PDA-like computer systems. eForth donated a single line stroke font with about 82'000 glyphs (Single.ccg file) and an outline font with about 27'000 glyphs (Song.ccg file) to the A2 project based on a free license.*

Example of character composition:

The radical 日 rì which means “sun” composed with the radical 月 yuè which means “moon” produces the composite glyph 明 míng which means “bright”, a radical-like glyph which itself composed with the radical 皿 mín which means “basin” produces the composite glyph 盟 méng which means “ally”.

A2 includes a Chinese tutorial text cn.PrgInOberon.txt translation of:

“Programming in Oberon” by H. Mössenböck and N. Wirth, ETH Zürich.

**Shortcut:** Main menu → Docu → Chinese Tutorial

Also the A2 compiler errors are available in their Chinese translation in the file cnErrors.XML. These translations were kindly provided by Qingyong Chen

Chongqing University  
Chongqing 400044  
P. R. China

The following short collection of commented references will help to clarify what the aim is:

Justification for implementing Dynamic Glyph Generation for Chinese (Hanzi or Kanji or Cang Jie, as you like) glyphs in A2:

“Dynamic Glyph Generation Based on variable length encoding schema”  
by Yap Cheah Shen – Kyoto University 21<sup>st</sup> Century COE Program 2003

[coe21.zinbun.kyoto-u.ac.jp/papers/ws-type-2003/093-yap.pdf](http://coe21.zinbun.kyoto-u.ac.jp/papers/ws-type-2003/093-yap.pdf)

[coe21.zinbun.kyoto-u.ac.jp/papers/ws-type-2003/yap.ppt](http://coe21.zinbun.kyoto-u.ac.jp/papers/ws-type-2003/yap.ppt)

Yap is working at eForth Technology, Inc. and kindly helped to implement CCG in A2.

The expression CCG = Chinese Composite Glyph was casted there.

Based on the work of:

Prof. Hsieh Ching-Chun - [www.iis.sinica.edu.tw/~hsieh/](http://www.iis.sinica.edu.tw/~hsieh/)

Adjunct Faculty Research Fellow at the Academia Sinica in Taipei

[www.sinica.edu.tw/main\\_e.shtml](http://www.sinica.edu.tw/main_e.shtml)

Used by eForth Technology, Inc. in Taiwan for their OS on embedded CPU

[www.eforth.com.tw/](http://www.eforth.com.tw/)

[www.eforth.com.tw/academy.htm](http://www.eforth.com.tw/academy.htm)

Some details in: [www.eforth.com.tw/CT/Efeditor/index1.html](http://www.eforth.com.tw/CT/Efeditor/index1.html)

Papers about Chinese glyphs:

“A Heuristic Search Approach to Chinese Glyph Generation Using Hierarchical Character Composition”

by P.K. Lai, D.Y. Yeung, M.C. Pong, Computer Processing of Oriental Languages, Vol. 10, No. 3, 1996

“New Ideographs in Unicode 3.0 and Beyond”

by J.H. Jenkins, 15<sup>th</sup> International Unicode Conference, San Jose, CA, 1999.

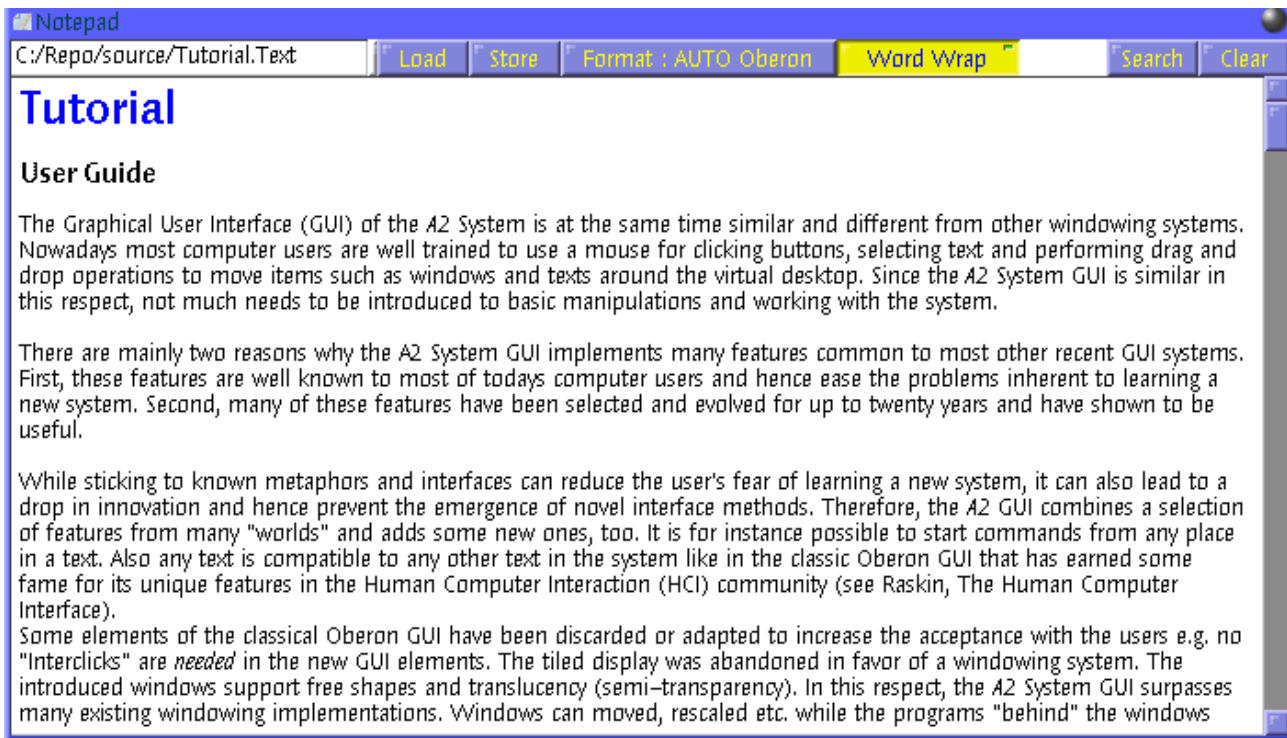
For those interested in Chinese literature, culture and in particular CJK:

Robert Oestling's web site: [www.robos.org/chinese/](http://www.robos.org/chinese/)

Dylan's Place! : [www.sungwh.freemove.co.uk/index.html](http://www.sungwh.freemove.co.uk/index.html)

Chinese glyphs are inputted using the Pinyin IME described elsewhere.

## ***Text editor – GUI***



[ WMScreenShot.SnapShotRange text.bmp 700 400 0 0 ~ ]

<b>Usage</b>	<p>Edit a new text or a text stored in a file while offering to encode, respectively decode it, with one of the available Codecs defined in the Configuration.XML file. The currently available Codecs are (in the order in which they appear in the pop-up menu):</p> <table border="1" data-bbox="456 1122 1414 1469"> <thead> <tr> <th>Format : pop-up</th><th>Codec</th></tr> </thead> <tbody> <tr> <td>Oberon</td><td>The ETH Oberon format, which is used for source text</td></tr> <tr> <td>BBT</td><td>The Bluebottle format</td></tr> <tr> <td>UTF-8</td><td>8-bit Unicode Transformation Format</td></tr> <tr> <td>ISO8859-1</td><td>Pure ASCII</td></tr> <tr> <td>HEX</td><td>16 bytes in hexadecimal separated by blanks on each line</td></tr> <tr> <td>AUTO</td><td>Automatically using the decoder matching the encoder used when the data was stored. This information is recorded.</td></tr> </tbody> </table>	Format : pop-up	Codec	Oberon	The ETH Oberon format, which is used for source text	BBT	The Bluebottle format	UTF-8	8-bit Unicode Transformation Format	ISO8859-1	Pure ASCII	HEX	16 bytes in hexadecimal separated by blanks on each line	AUTO	Automatically using the decoder matching the encoder used when the data was stored. This information is recorded.
Format : pop-up	Codec														
Oberon	The ETH Oberon format, which is used for source text														
BBT	The Bluebottle format														
UTF-8	8-bit Unicode Transformation Format														
ISO8859-1	Pure ASCII														
HEX	16 bytes in hexadecimal separated by blanks on each line														
AUTO	Automatically using the decoder matching the encoder used when the data was stored. This information is recorded.														
<b>Start</b>	<p>Notepad.Open [options] [fileName] ~  options  "-f=", "--format=" : take the value to assign from the Format table above.  Put UTF-8 and ISO8859-1 between quotes. AUTO is used by default.  When "fileName" is omitted, an empty text appears.  Several editors may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Edit → Text (with empty text)</p>														
<b>Stop</b>	<p>Close the window(s).  To clean up: SystemTools.Free Notepad ~</p>														
<b>Restorable</b>	<p>Yes</p>														
<b>Data files</b>	<p>DefaultTextStyles.XML  Window icon: WMIcons.tar://Notepad.png</p>														

## Keyboard layout for A2 (on bare hardware)

A2 is set up to operate with a standard US keyboard. To customize A2 for a specific language the value assigned to “Keyboard=” in the configuration data must be adjusted to use the corresponding layout file. Details are found in:

<http://www.ocp.inf.ethz.ch/wiki/Documentation/Configuration#toc11>

## Mouse layout for A2 (on bare hardware)

A freshly installed A2 system, using the A2 deliverable, assumes that the machine is equipped with a 3-button mouse, either with a MM button or a wheel as equivalent, for ease of use. ML and MR are most essential for editing and navigating in a text.

For a 2-button mouse, considered to have only ML and MR, MM can be simulated by the Ctrl key, either left or right, after having set the configuration string “MB=2”,

See: <http://www.ocp.inf.ethz.ch/wiki/Documentation/Configuration#toc12>

## Text markers and text navigation

The A2 text editor supports several kinds of text *markers*. The following are used everywhere:

- the *point position marker*
  - a small vertical red bar of the height of a line, called “caret”
- the *text range marker*
  - a translucent blue text overlay to highlight a text selection
  - a straight underline to highlight a command just about to be executed

PET uses in addition:

- a special *point position marker*, a translucent image positioned with an offset relative to a text position at the base line. It is used to mark compiler detected errors in a program text
- a special *text range marker*, an undulated underline to mark errors or possible problem places

For the navigation in a text, the caret, the mouse pointer, the mouse scroll wheel and other special keys are used, most often in combination. Selection of text is performed either with the mouse or with the keyboard. Supporting both is dictated by the time overhead of moving the hands from the keyboard to the mouse and back.

## Editing with the mouse

Point position in text	
<b>MLclick</b>	<b>Set the caret:</b> Move the mouse pointer to the intended point in the text then click ML.

Select a text stretch and operate on this text range	
<b>ML press &amp; drag</b>	<b>Select stretch:</b> Move the mouse pointer to the beginning of the intended selection, press ML to set the caret and drag the mouse in any direction,



	progressively highlighting the text stretch with a blue text range marker. Release ML. The scroll wheel can be used during the operation to navigate in the text.
<b>ML click double</b>	<b>Select word:</b> double click ML selects the entire surrounding word.
<b>ML press &amp; drag + MR</b>	<b>Cut:</b> Select stretch and instead of releasing ML, press MR. This cuts the text stretch.
<b>ML press &amp; drag, ML press &amp; drag</b>	<b>Cut and drop:</b> Select stretch, then place the mouse cursor amidst the selection, press ML and drag the selection to the insertion point with the help of the moving caret.
<b>ML press &amp; drag, Ctrl press + ML press &amp; drag</b>	<b>Copy and drop:</b> Select stretch, hold Ctrl down, then set the caret amidst the selection and drag the selection to the insertion point with the help of the moving caret.

<b>Operate on a command name or a document name appearing in a text.</b> When the mouse pointer is positioned on a word and MM is pressed, the word is underlined in red.	
<b>MM</b>	<b>Execute</b> a command when the mouse pointer is positioned on a valid command name.
<b>MM + MR</b>	<b>Open a document</b> when the mouse pointer is positioned on a document name.

## Editing with the keyboard

	<b>Move the caret</b>
<b>Arrow left</b>	one character left
<b>Arrow right</b>	one character right
<b>Arrow down</b>	one line down
<b>Arrow up</b>	one line up
<b>End</b>	to the end of the line
<b>Home</b>	to the beginning of the line
<b>Ctrl+End</b>	to the end of the text
<b>Ctrl+Home</b>	to the beginning of the text
<b>PageDown</b>	one visible page down
<b>PageUp</b>	one visible page up

<b>Shift+</b>	<b>Move the caret</b>	<b>and</b>
<b>Arrow left</b>	one character left	select a character, a line, a page OR de-select depending in which direction the caret is moving
<b>Arrow right</b>	one character right	
<b>Arrow down</b>	one line down	
<b>Arrow up</b>	one line up	
<b>End</b>	to the end of the line	
<b>Home</b>	to the beginning of the line	
<b>Ctrl+End</b>	to the end of the text	
<b>Ctrl+Home</b>	to the beginning of the text	
<b>PageDown</b>	one visible page down	

<b>PageUp</b>	one visible page up	
---------------	---------------------	--

	<b>Operate a selection or on a selection</b>	
<b>Ctrl+A</b>	Select entire text	
<b>Ctrl+C</b> or <b>Ctrl+Insert</b>	Copy to clipboard	
<b>Ctrl+V</b> or <b>Shift+Insert</b>	Paste from clipboard	
<b>Ctrl+W</b>	Paste clipboard of host operating system	
<b>Ctrl+X</b> or <b>Shift+Delete</b>	Copy to clipboard and delete	
<b>Ctrl+Y</b>	Redo – Can occur step by step if the last operation was complex	
<b>Ctrl+Z</b>	Undo – Can occur step by step if the last operation was complex	
<b>Tab</b>	Indent selection by one tab length to the right	
<b>Shift+Tab</b>	Indent selection by one tab length to the left	

	<b>Operate on a command name or a document name appearing in a text. The same control as can be exercised with MM on a 3-button mouse. With a 2-button mouse, Ctrl is the substitute for MM</b>	
<b>Ctrl+Enter</b>	<b>Execute</b> a command when the caret is positioned on a valid command name.	
<b>Ctrl+Shift+Enter</b>	<b>Open the document</b> when the caret is positioned on a document name.	

	<b>Check text healthiness; control IME</b>	
<b>Ctrl+T</b>	Check the healthiness of the text piece list. Errors are listed in the Kernel Log.	
<b>Ctrl+Space</b>	Enable/disable an IME.	

## Editing with a combination of mouse and keyboard

	<b>Operate on a command name appearing in a text in PET</b>	
<b>Shift+MM</b>	Open the document in a new window and not in the existing PET window.	

	<b>Operate on a document name appearing in a text in PET</b>	
<b>Shift+MM+MR</b>	Open the document in a new window and not in the existing PET window.	

## Editing with the PieMenu

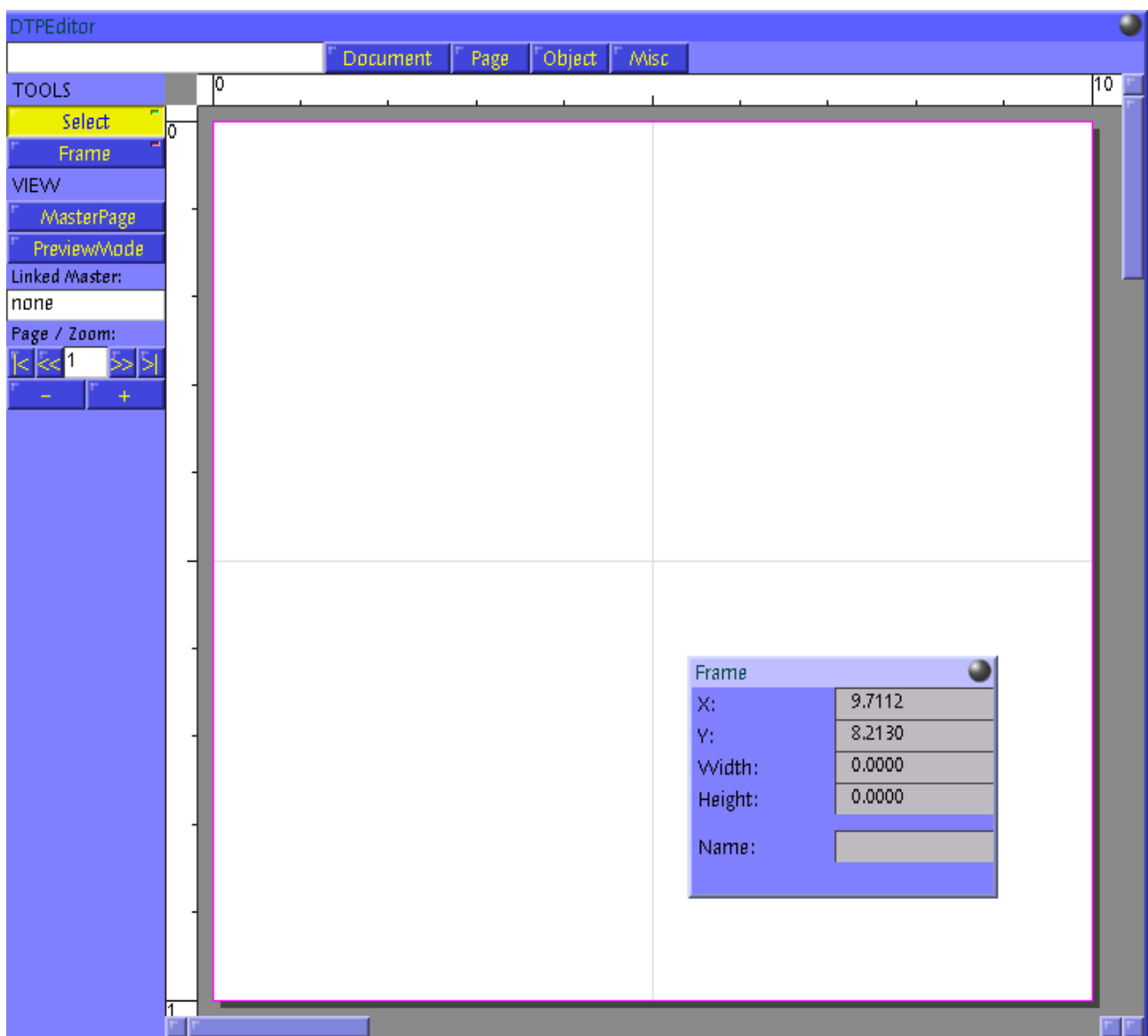
An alternative method to using mouse and keyboard for a few often used operations.

### ***PieMenu - GUI***

<b>Usage</b>	A context sensitive menu for editing text, opening a text or executing a command in a text editor. Use it as a substitute for mouse and keyboard actions described above in four frequently used situations.
<b>Start</b>	In any text editor, move the mouse pointer to an intended point in text, then press MR and hold it down to open a pie with four labeled sectors. Hovering the mouse pointer over the sectors causes the color of the pointed sector to darken.

	Releasing MR launches one of the following action, depending on the sector: <table border="1"> <thead> <tr> <th>Sector</th><th>Action on releasing MR</th></tr> </thead> <tbody> <tr> <td>Copy</td><td>Copy a selected text to the clipboard.</td></tr> <tr> <td>Paste</td><td>Paste the clipboard text to the mouse pointer's position.</td></tr> <tr> <td>Open</td><td>Open the text corresponding to the name pointed to.</td></tr> <tr> <td>Start</td><td>Start the command pointed.</td></tr> </tbody> </table>	Sector	Action on releasing MR	Copy	Copy a selected text to the clipboard.	Paste	Paste the clipboard text to the mouse pointer's position.	Open	Open the text corresponding to the name pointed to.	Start	Start the command pointed.
Sector	Action on releasing MR										
Copy	Copy a selected text to the clipboard.										
Paste	Paste the clipboard text to the mouse pointer's position.										
Open	Open the text corresponding to the name pointed to.										
Start	Start the command pointed.										
<b>Stop</b>	The pie disappears automatically when MR is released. (Component: WMPieMenu.Mod)										


## Desktop publishing editor – GUI



[ WMScreenShot.SnapShotRange test.bmp 720 650 0 0 ~ ]

<b>Usage</b>	A desktop publishing editor.
<b>Start</b>	DTPEditor.Open [fileName] ~  Several editors may be running in parallel.  <b>Shortcut:</b> Main menu → Edit → DTP
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free DTPEditor DTPView DTPUtilities DTPData ~
<b>Restorable</b>	Yes
<b>Data files</b>	DTPData.Mod, DTPUtilities.Mod, DTPView.Mod, DTPEditor.Mod DTPText.Mod, DTPRect.Mod, DTPIImage.Mod / Demo.Style.XML, Demo.Layout.XML, Demo.Content.XML

## Text style editor - GUI

<b>Usage</b>	A tool for changing the look of a text stretch (font, font size, text color) and for marking text stretches according to predefined conventions used by programmers.
<b>Start</b>	<p>WMTextTool.Open ~    Open a text style panel</p>  <p>[ WMScreenShot.SnapShotRange test.bmp 125 240 0 0 125 240 ~ ]</p> <p>An MM-click on one of the several buttons allows changing the look of a text stretch selected in a document opened in an editor (Notepad or PET). The top 8 buttons are for use by <i>Active Oberon</i> programmers and enforce conventions which have progressively adopted as a means to make programs more readable. These are not compulsory but simply common sense.</p> <p>The Get button allows gathering font, font color and size, background color information for the selected text stretch. The Apply button sets these values.</p> <p><b>Shortcut:</b> Main menu → Edit → Styles</p> <p>The following commands are at a user's disposal, Some of them are implicitly and more conveniently executed using the text style panel. These could also be appropriately used in HotKeys.XML.</p> <p>WMTextTool.SetFontSize [ "Absolute"   "IncrementBy"   "DecrementBy" ] [value] ~ When no value is given for increment or decrement the default value 1 is used.</p>

	<p>WMTextTool.SetFontStyle [ "normal"   "bold"   "italic" ] ~ normal is the default value.</p> <p>WMTextTool.SetFontName [fontName] ~ Oberon the the default fontName.</p> <p>WMTextTool.SetFontColor [foreroundColor [backgroundColor] ] ~</p> <p>These commands operate on a selected text stretch without altering it and the result appears in the Kernel Log:</p> <p>WMTextTool.CountLines ^ ~  WMTextTool.CountWords ^ ~  WMTextTool.CountCharacters ^ ~  WMTextTool.CountAll ^ ~ count characters, words and lines</p> <p>Several tools may be running in parallel.</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMTextTool ~</p>
<b>Restorable</b>	Yes
<b>Data file</b>	Window icon: WMIcons://WMtextTool.png

## OpenType True Type Fonts (TTF) detector

<b>Usage</b>	<p>Searches through all the mounted file systems for True Type Fonts, listing them in the Kernel log. Example of output:</p> <pre> *** TrueType MultiTester v0.1 *** Testing File: G:/Aos/source/VeraSeBd.ttf          all ok Testing File: G:/Aos/source/Vera.ttf              all ok Testing File: G:/Aos/source/benevento.ttf          all ok Testing File: G:/Aos/source/VeraMol.ttf           all ok Testing File: G:/Aos/source/VeraI.ttf             all ok Testing File: G:/Aos/source/VeraBd.ttf            all ok Testing File: G:/Aos/source/VeraBI.ttf            all ok Testing File: G:/Aos/source/VeraMoBd.ttf          all ok Testing File: G:/Aos/source/VeraSe.ttf            all ok Testing File: G:/Aos/source/VeraMo.ttf            all ok Testing File: G:/Aos/source/VeraMoBI.ttf          all ok ..... *** all done ***  10 Bitstream Vera TTFs and benevento.ttf are freely available without copyright offence (FreeType).</pre>
<b>Start</b>	WMOTFonts.MultiTest ~
<b>Stop</b>	To clean up: SystemTools.Free WMOTFonts ~
<b>Data files</b>	OpenTypeInt.Mod, OpenTypeScan.mod, OpenType.Mod, OpenTypeFonts.Mod, WMOTFonts.Mod

## Bitstream Vera

Bitstream Vera from Bitstream – <http://new.myfonts.com/foundry/bitstream/> is a True Type font with full hinting instructions, which improve its rendering quality on low-resolution devices such as computer monitors. It consists of serif, sans-serif and monospace fonts

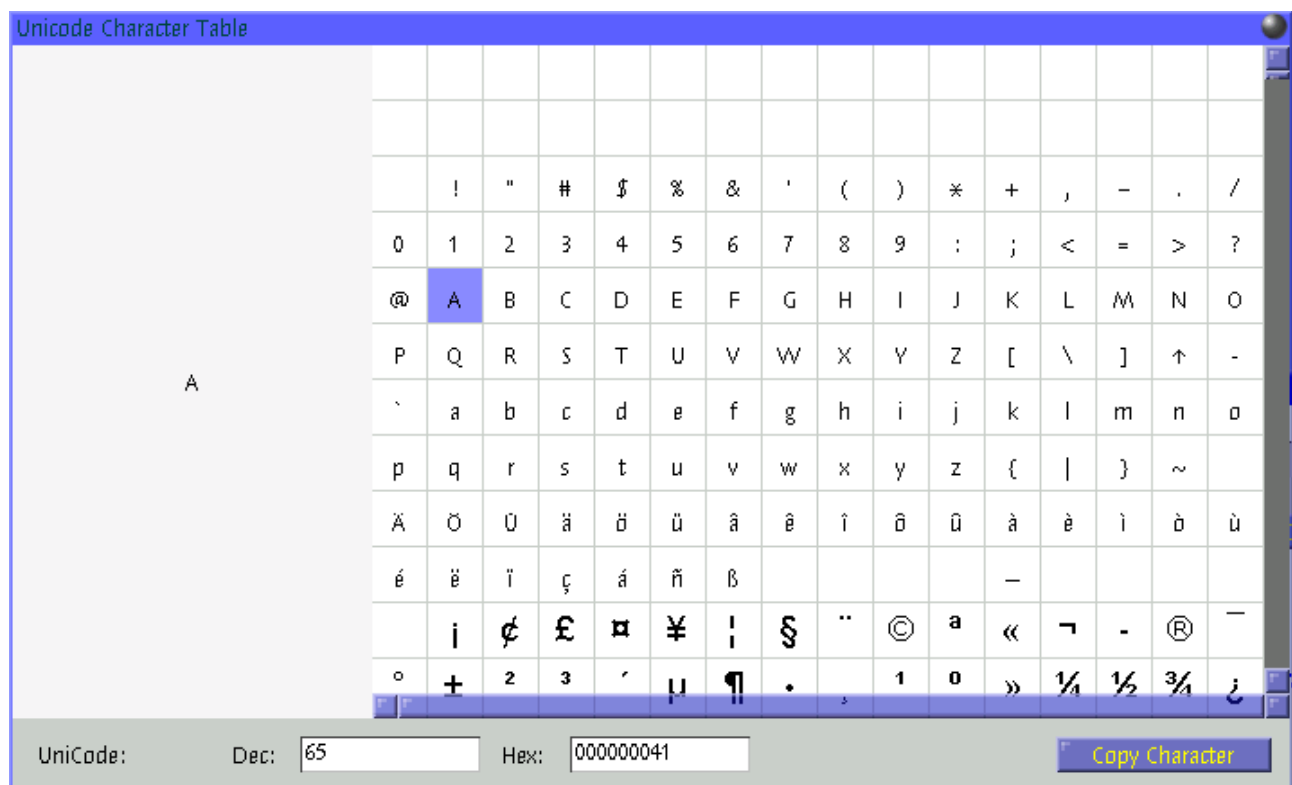
and covers only common punctuation and the Latin alphabet with some diacritics. Its liberal license allows others to make and distribute derivative works with some restrictions, and the DejaVu fonts (also Open Type) project is expanding it with additional glyphs.

## Scriptorium Benevento

Benevento from Scriptorium - [new.myfonts.com/foundry/scriptorium/](http://new.myfonts.com/foundry/scriptorium/) is a True Type font family with 3 fonts based on late Roman period Lombardic calligraphy.

## Complete Unicode table

A large number of Unicode fonts are available from the Web. Alan Wood's Unicode Resources at [www.alanwood.net/unicode/fonts.html](http://www.alanwood.net/unicode/fonts.html) is a good starting point for exploring the subject.



[ WMScreenShot.SnapShotRange test.bmp 715 435 0 0 ~ ]

<b>Usage</b>	<p>A table with all the Unicode characters: latin, cyrillic, arabic, hebraic, chinese, korean, japanese, etc. The program attempts to use the Bitstream Cyberbit font when installed (see Cyberbit TTF downloader) or else it uses the system defined Default font.</p> <p>Select a character, with a MM click, to let the decimal and hexadecimal character value appear at the bottom. Conversely, enter a decimal or hexadecimal value in an input field to see the corresponding glyph.</p> <p>To insert a character in an editor, select the character, click „CopyCharacter“, set the cursor at the desired location in a text and press Ctrl+V.</p>
<b>Start</b>	WMCharMap.Open ~ At the right the entire array of 65'535 glyphs appears in lines

	of 16 glyphs/line. At the left a preview of a selected glyph appears. Several maps may be running in parallel.  <b>Shortcut:</b> Main menu → Edit → UnicodeMap
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free WMCharMap ~

## Unicode marker tool

<b>Usage</b>	??? Purpose ?
<b>Start</b>	WMUnicodeMarkerTool.Open ~ Several marker tools may be running in parallel.  <b>Shortcut:</b> Main menu → Edit → Unicode Markers
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free WMUnicodeMarkerTool ~
<b>Restorable</b>	Yes

## Cyberbit TTF downloader

This does not qualify as application, only as a demonstration on how a manual download using FTPClient, described in the Communication section, can be automated. It can also be downloaded using WMFTPClient (use then [anonymous@the.net](mailto:anonymous@the.net) as user@password).

A2 supports Unicode effectively: PET and Notepad are Unicode-savvy applications.

<b>Usage</b>	The font file Cyberbit.ZIP is downloaded and stored locally. Only this larger file is downloaded. Unzip it to obtain Cyberbit.ttf (Size is 13.4 MB) The complete Unicode table can be viewed by executing WMCharMap.Open ~  Documentation in: <a href="ftp://ftp.netscape.com/pub/communicator/extras/fonts/windows/ReadMe.htm">ftp://ftp.netscape.com/pub/communicator/extras/fonts/windows/ReadMe.htm</a>  Cyberbit is available free to the Unicode consortium members for non-commercial use.
<b>Start</b>	CyberbitNetInstall.Start ~
<b>Stop</b>	To clean up: SystemTools.Free CyberbitNetInstall FTPClient ~

## Bitstream Cyberbit

Bitstream Cyberbit from Bitstream – <http://new.myfonts.com/foundry/bitstream> is a font family with 1 style of the Times Roman family. A font family encompasses different foundries' versions, or a foundry's different cut, of basically the same typeface design. It was developed by Bitstream to provide Unicode Consortium members with a large Unicode font for testing and development purposes and is free-ware for non-commercial uses.

It is a serif font with small finishing strokes at the end of the main stems, arms, and tails of characters (a sans-serif font does not have).

Based on Bitstream's Dutch 801 BT font family, it is a Unicode True Type Font including

many of the typographic characters for most of the world's languages according to

Unicode 2.0 standards:

Basic Latin/English letters (Latin)

West European diacritics (Latin 1)

Ligatures

Central Europe (Latin 2)

Baltic Rim (Latin 6)

Turkish (Latin 5)

Romanian

Vietnamese

Phonetic

Cyrillic

Greek Modern

Arabic

Hebrew

Thai

Hanzi/Kanji (Chinese/Japanese/Korean)

Other Open Type

Dingbats/Symbols

Three separate files: Cyberbit.ttf (complete font), Cyberbase.ttf (Cyberbit without the CJK) and CyberbitCJK.ttf (CJK only) can be downloaded from Netscape by FTP:

<ftp://ftp.netscape.com/pub/communicator/extras/fonts/windows/>

CJK refers to the languages of Chinese, Japanese, and Korean, though occasionally they will mean the countries China, Japan and Korea respectively, and therefore refer to the 'locale' of the script in question.

These countries use non-alphabetic characters based on the traditional Chinese script "hanzi", otherwise known in Japan as "kanji", and by Koreans as "hanja". For simplicity, we shall call them "characters". We can further differentiate the forms of the same characters as 'glyphs'. A 'glyph', therefore, is a variant of a character and varies depending on locale.

### ***Hobbes' Chinese tool - Chinese character identifier***

Requires to install the file Unihan.txt which is not included in the release. A complete copy of the Unihan database is available as a (very large) zipped [text file](#) on the Unicode Consortium's official ftp site [unicode.org](http://unicode.org). This file includes all the data of the on-line database plus additional information. Information on how to parse the file is included in the file itself. For an overview, see the description of Unihan fields in the accompanying [Unihan.html](#) file. Unihan.zip is sized 6.24 MB, the extracted Unihan.txt is 29'206 MB.

Use WMFTPClient.Open ~ and connect to: <ftp://ftp.unicode.org> signing-in as "anonymous" and password <e-mail address> then follow the path: /Public/zipped/5.1.0/Unihan.zip

<b>Usage</b>	A tool to identify one out of 83201 chinese glyphs by interpreting it, with the help of the Unihan.txt file, into: pinyin, mandarin, cantonese, korean, to translate it approximately into english (often with multiple words or meanings) and finally to give its Unicode position. Conversely, given the code, the glyph is obtained. Observe the parallel with the Unicode character table described earlier.
<b>Start</b>	CharacterLineup.Open ~ The lower window lists all the available glyphs. When a glyph on the line above is selected, the lower part then shows the filtered-out glyphs containing the selected one. For each additional character selected the filtering is repeated. A selected glyph can be de-selected. This is best demonstrated by operating on the 3 first glyphs at the left in different combinations.



	Follow the Kernel Log output to see how many glyphs are still composed with the selected glyphs while the selection progresses.
<b>Stop</b>	To clean up: SystemTools.Free CharacterLineup UnihanParser ~
<b>Data files</b>	Unihan.txt

## Input Method Editors (IME)

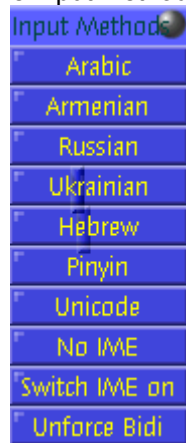
WMInputMethods defines an abstract IME and a plug-in mechanism for specific implementations. A text editor can call an instance of an IME as a layer between its keyboard message handler and its character insertion routine. The editor discerns between “navigation key” events and “modification key” events. In case of a “modification key” event, it checks if an IME is active on the editor. If so, it forwards that event to the active IME and the character is processed:

either with simple mapping to another Unicode character (thus acting like a keyboard driver), as is for example the case for Russian and Ukrainian.  
or with complex processing, as is the case for Pinyin.

When no IME is active, the character represented by the key is directly inserted into the text model.

After having installed an IME, enabling and disabling the IME makes it possible to quickly change between input methods for different character sets. For example, disabling the IME is used to type email addresses, URLs or commands. Experienced writers often enable, disable and change IME in rapid successions to write words in different languages or scripts. Enabling and disabling an IME is done using the IME tool described next or with the key shortcut Ctrl-Space (see Text Editor section). It is not required to unload the IME.

### IME tool – GUI

<b>Usage</b>	A graphical tool for activating one of the IMEs.
<b>Start</b>	<p>WMInputMethodTool.Open ~    The Input Methods panel opens:</p>  <p>[ WMScreenShot.SnapShotRange test.bmp 90 220 0 0 ~ ]</p> <p>A mouse click on one of the 7 supported IMEs installs it, by executing, in the background, one of the Install commands described in the seven following</p>

	<p>sections. For Pinyin and Unicode, the way to proceed with inputting data to the editor is described.</p> <p>It is necessary to activate the IME and that is done:</p> <ol style="list-style-type: none"> <li>1. with a mouse click on the “Switch IME on” button</li> <li>2. by pressing Ctrl-Space on the keyboard (toggles IME on/off)</li> <li>3. automatically when switching to another IME and one is already active</li> </ol> <p>The button of an active IME turns green.</p> <p>Inactivating the current IME is done:</p> <ol style="list-style-type: none"> <li>1. with a mouse click on the “Switch IME off” button</li> <li>2. by pressing Ctrl-Space on the keyboard (toggles IME on/off)</li> </ol> <p>Returning to operating without IME is done with a mouse click on “No IME”.</p> <p>Arabic and Hebrew, two languages written from right to left, require an editor with that capability. Though code was specially developed for that purpose, it is not operational. Arabic also wants an editor capable of changing the letter shape depending on whether they appear at the beginning, middle or end of a word, or on their own. That was not taken into account. Note: Bi-directional input is something different and is also called “boustrophedon”.</p> <p><b>Shortcut:</b> Main menu → Edit → Input Methods</p> <p>WMInputMethodTool ChangeAppearance ~ ???</p> <p>Several tools may be running in parallel. (What does it mean and imply?)</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMInputMethodTool WMUnicodeIME WMPinyinIME WMHebrewIME WMArmenianIME WMUkrainianIME WMRussianIME WMArabidIME ~</p>
<b>Restorable</b>	Yes

## Arabic

<b>Usage</b>	Not usable as is. Must be improved. The editor must handle right to left input and this efficiently. It does not.
<b>Start</b>	WMArabidIME.Install ~

## Armenian

<b>Usage</b>	Simple one-to-one mapping to Armenian.
<b>Start</b>	WMArmenianIME.Install ~ After having installed the IME, activate/deactivate it with the hot key Ctrl-Space.

## Russian

<b>Usage</b>	Simple one-to-one mapping to Russian Cyrillic.
<b>Start</b>	WMRussianIME.Install ~ After having installed the IME, activate/deactivate it with the hot key Ctrl-Space.

## Ukrainian

<b>Usage</b>	Simple one-to-one mapping to Ukrainian Cyrillic.
<b>Start</b>	WMUkrainianIME.Install ~ After having installed the IME, activate/deactivate it with the hot key Ctrl-Space.

## Hebrew

<b>Usage</b>	Not usable as is. Must be improved. The editor must handle right to left input and this efficiently. It does not.
<b>Start</b>	WMHebrewIME.Install ~

## Chinese - Pinyin for Hanzi glyphs

Pinyin is the most commonly used romanization system for standard Mandarin and *pinyin* means "phonetics", or more literally, "spelling sound" or "spelled sound" in the Latin alphabet of a Hanzi glyph.

Usage	WMPinyinIME implements a complex IME.																														
Start	<p>WMPinyinIME.Install ~</p> <p>When the IME gets the first key event from the editor, it opens a small window next to the cursor position in the main editor and tells the display space manager to forward keyboard events to the new window. Inside that IME window, key strokes are sent to an embedded editor. While typing, all possible glyphs or compounds that match the pronunciations typed so far are displayed. The list is sorted by usage frequency as taken from the UniHan database, and each line shows at the left the Hanzi glyph and at the right the Pinyin value with a tone number appended. Chinese uses 4 tones given here in the example “ma” with an assumed loudness scale from 0 to 5 (see the “Tone symbol” in the next figure).</p> <table><tr><th colspan="4">STANDARD CHINESE    <b>ma</b></th></tr><tr><th>Chinese Character</th><th>Tone symbol</th><th>Tone description</th><th>English gloss</th></tr><tr><td>媽</td><td>ㄇ    55</td><td>high level</td><td>‘mother’</td></tr><tr><td>麻</td><td>ㄇ    35</td><td>high rising</td><td>‘hemp’</td></tr><tr><td>馬</td><td>ㄇ    214</td><td>low falling</td><td>‘horse’</td></tr><tr><td>罵</td><td>ㄇ    51</td><td>high falling</td><td>‘scold’</td></tr></table> <p>The appended tone number can be mapped as follows:</p> <table><tr><th>Tone number</th><th>Tone description</th></tr><tr><td>1</td><td>High level</td></tr><tr><td>2</td><td>High rising</td></tr></table>	STANDARD CHINESE <b>ma</b>				Chinese Character	Tone symbol	Tone description	English gloss	媽	ㄇ    55	high level	‘mother’	麻	ㄇ    35	high rising	‘hemp’	馬	ㄇ    214	low falling	‘horse’	罵	ㄇ    51	high falling	‘scold’	Tone number	Tone description	1	High level	2	High rising
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	<table><tr><td>3</td><td>Low falling</td></tr><tr><td>4</td><td>High falling</td></tr><tr><td>5</td><td>neutral</td></tr></table>	3	Low falling	4	High falling	5	neutral
3	Low falling						
4	High falling						
5	neutral						
	Use the cursor up or down to select the desired glyph and pres Enter to finish.						
<b>Data files</b>	PinyinIMEPhrases.txt, PinyinIMETable.txt Single.ccg: Single line stroke font with about 82'000 glyphs Song.ccg: Outline font with about 27'000 glyphs						

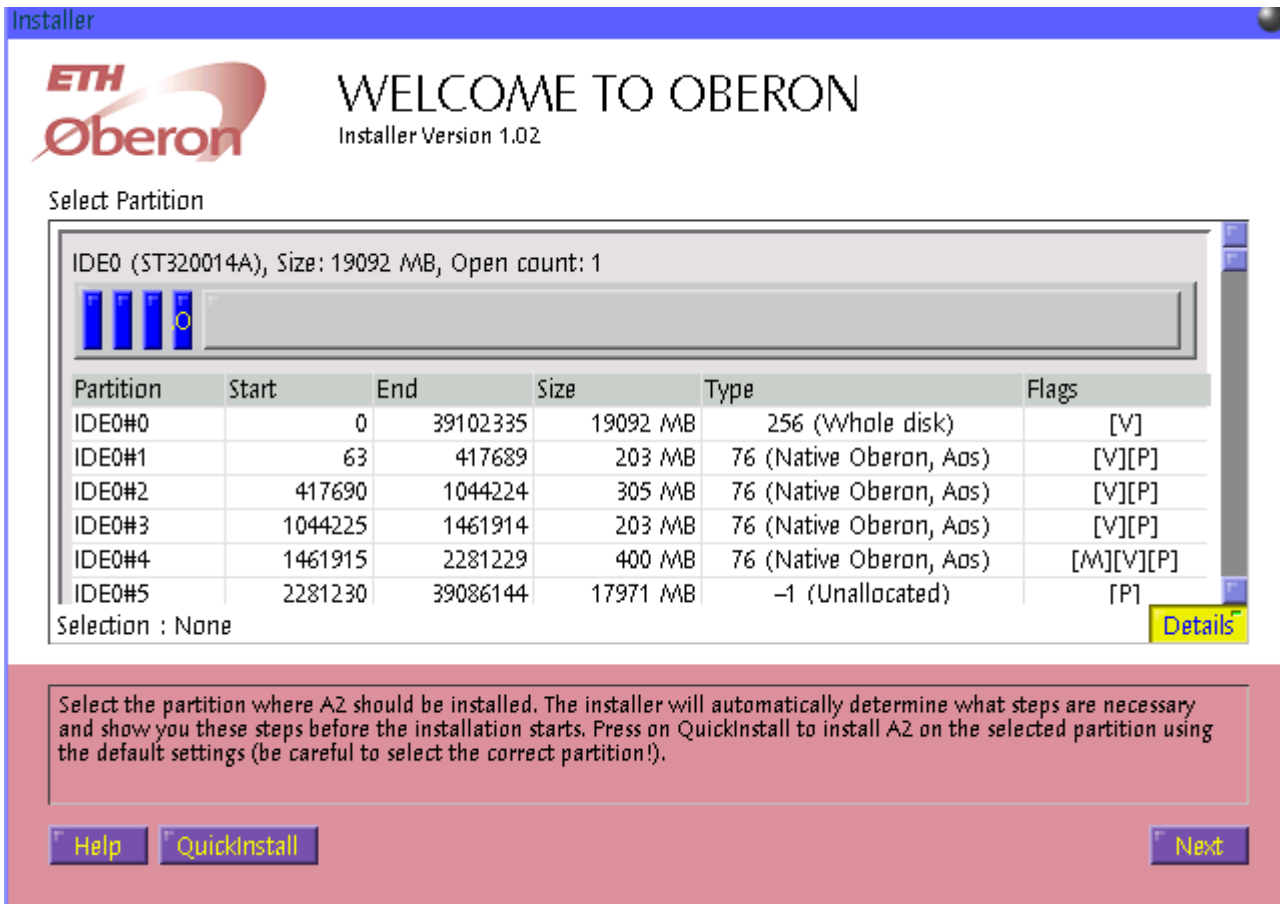
The simple selection strategies of WMPinyinIME and its limited dictionary of characters and phrases leave room for improvement. To match the usability level of the best commercial Pinyin IMEs, support for automatic learning of new character usages, a better prediction method as well as support for certain pronunciations tolerance should be added to it.

## Unicode

<b>Usage</b>	A very primitive way to insert a Unicode character in an editor.
<b>Start</b>	WMUnicodeIME.Install ~ After having installed the IME, activate/deactivate it with the hot key Ctrl-Space.  Position the cursor at the desired position in an editor. Then, knowing the decimal position in the Unicode table of the character to insert, type its value and finish with a carriage return. As soon as the first digit is pressed, a small window opens next to the cursor position. The top line displays the digits as input progresses, the lower part displays the corresponding Unicode, which may exist or not. Use Backspace to correct the input.

# Installation including partitioning and formatting

## Installer – GUI



Usage	<p>Install A2 on a partition and optionally, according to the situation, create a partition, format it and perform various advanced operations needed in anticipation of the installation.</p> <p>This is the first application that is tackled when undertaking the installation of A2 from an A2 live CD.</p> <p><b>Pre-condition:</b></p> <p>To put the odds in one's favor when tackling an A2 installation, make sure that the machine's equipment fits the Hardware Compatibility information provided <a href="http://www.ocp.inf.ethz.ch/wiki/Documentation/HardwareCompatibility">http://www.ocp.inf.ethz.ch/wiki/Documentation/HardwareCompatibility</a></p>
Start	<p>WMInstaller.Open ~</p> <p>Opens a "Welcome to Oberon" window, as shown, with a list of all the <b>detected mass storage devices for which a driver is installed</b>. For each device, a text line indicates the device name assigned by A2, the volume size and the number of mounted partitions. Below, a horizontal bar summarizes the position and the size of partitions and free space. Clicking on [Details] exposes the details needed to proceed with the installation. A volume is logically divided in 512-byte blocks addressable with their LBA (Logical Block Address) starting from 0 up to the volume capacity. The columns "Start" and "End" contain LBA values.</p> <p>The first detail line exposes the (Whole disk) named device#0. Partitions and unallocated space are listed and numbered sequentially in the order in which they are recognized. A2 partitions have the partition type 72. Partitions can be flagged</p>

	<p>as:</p> <p>[B] bootable = active (only one may be active)  [M] mounted = accessible to A2  [P] primary = defined by a partition entry of the MBR  [V] valid = volume contains a valid partition table</p> <p>Read the instructions at the bottom and choose between  “QuickInstall” to conduct the installation without further ado or  “Next” to start a customized installation through a series of windows.</p> <p>The second screen shot below gives some idea of what packages are (see section “Packages”). While selecting packages, the amount of required space is displayed. Use “Next” to progress though the installation which should not take longer than a few minutes.</p> <p>Note that, en route, a button “Advanced” appears that allows to perform various actions selected with check boxes. A few of them are already selected because they are anyhow required for installing A2, that is, they will be performed even when “Advanced” is not invoked.</p> <p>Hint: a fresh complete A2 installation will not take more than 5 minutes.</p> <p><b>Shortcut:</b> Main menu → System → Installer</p> <p>WinAos: “No Disks” will normally appear in the first window, but virtual disks may be created (refer to that section) and A2 can then be installed in the same manner with the Installer.</p>
<b>Stop</b>	<p>Close the window.  To clean up: SystemTools.Free WMWInstaller ~</p>
<b>Data files</b>	WMInstaller.tar, InstallerPackages.XML

## Device name, partition name and partition prefix

Storage devices are detected in the first place by the BIOS in an order determined by BIOS (a function of the machine's features and equipment: some have no USB or no diskette for example) and the BIOS settings (controlled by the user: some devices may be declared not installed, the boot order is changeable, either permanently in the BIOS set-up or on the fly by way of the boot menu). The A2 kernel then takes over control and scans the PCI bus for the presence of devices and for each detected device evaluates if a driver is available. If so, the driver is installed. Mass storage devices are assigned a two-part *device name* in the form:

device = mnemonic digit

mnemonic stems from the device type: IDE, USB, Diskette, SCSI.

digit is an index, starting at 0, assigned in the order in which devices of a given type are detected.

Example: IDE0, IDE1, IDE2 for ATA devices HD master, CD-ROM slave, HD master

Mass storage devices are partitioned, with the exception of CD-ROMs and diskettes and a few exotic others. Partitions are assigned a two-part *partition name* in the form:

partition = device “#” digit

device was just described.

digit is an index, starting at 0, assigned in the order in which partitions are physically defined on the device. “0” designates the whole disk (partitioned or not).

A *partition prefix* is a symbolic name, say alias, assigned by the user when a partition is mounted and is used by the file manager for accessing files:

AOS:Configuration.XML

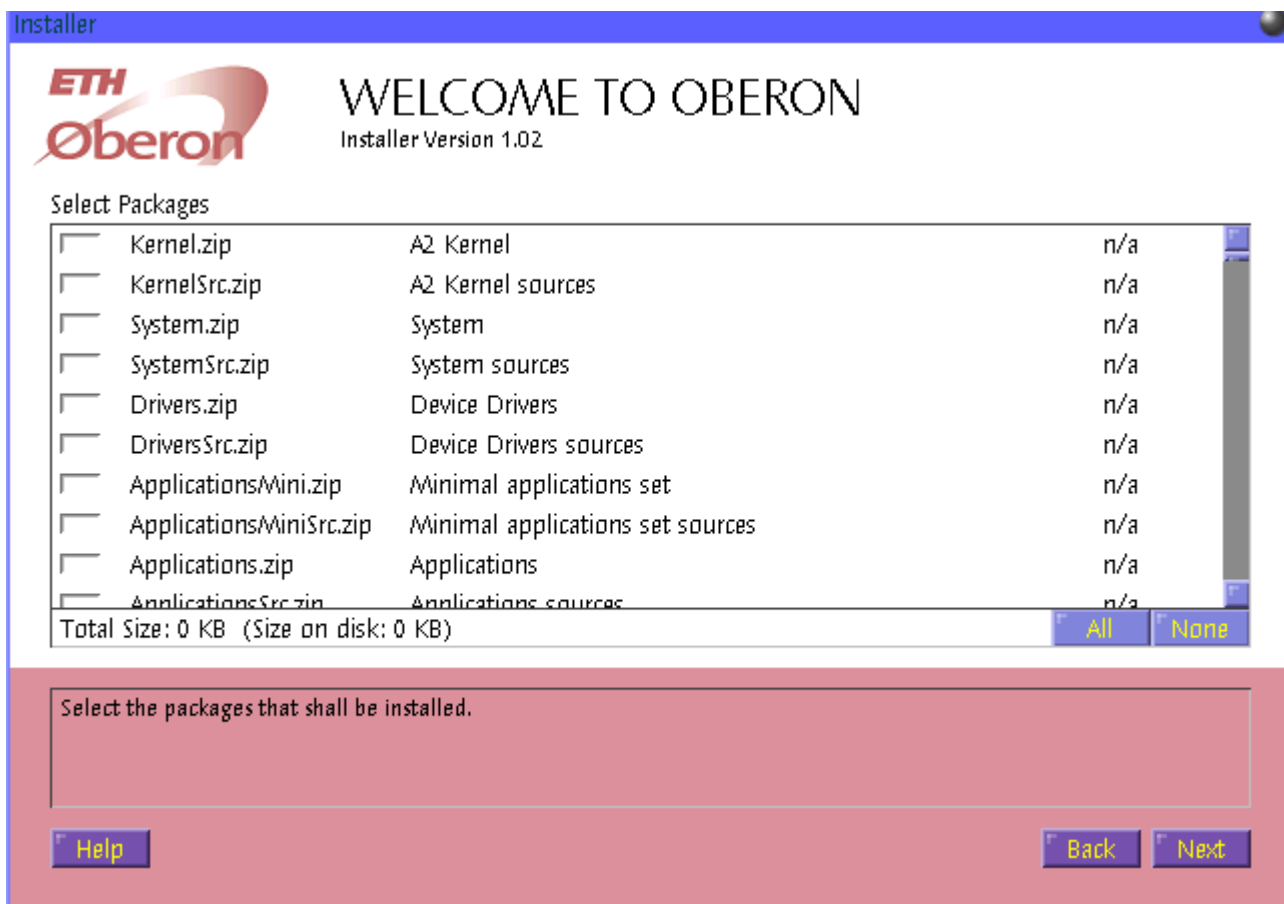
“AOS” denotes the partition of a working A2.

#### Removable devices

Pluggable USB devices may be inserted/removed at will and are recognized by A2 under the condition that the necessary driver is active. Two situations are anticipated. The working A2 kernel is:

USB.Bin - no action needed

IDE.Bin - the driver must be installed

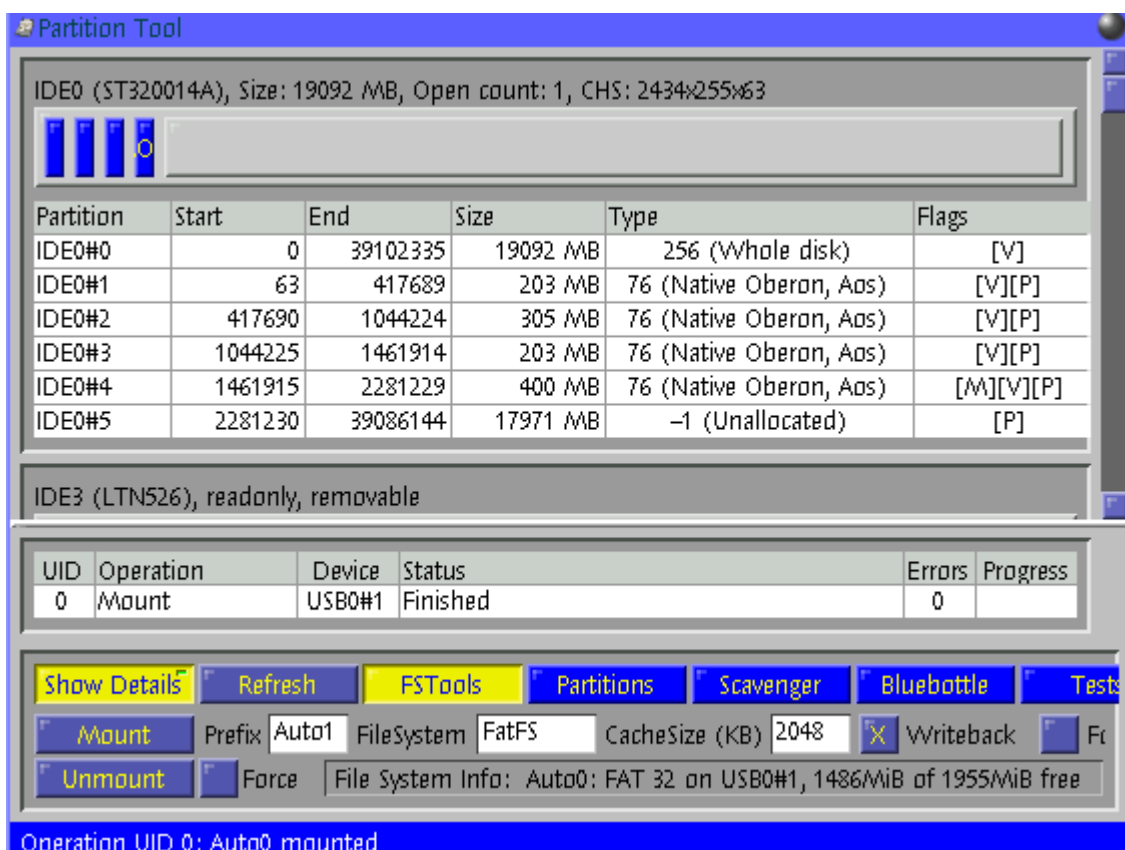


### **Partitions framework – GUI**

A great many elementary operations that can be commanded in this application can be routinely executed in a simplified manner with well chosen preset parameters and file names by the Installer application described before.

<b>Usage</b>	Volume partitioning and partition management tool with multiple capabilities. This application will play a greater role in the management and the maintenance of an
--------------	---

	<p>installed A2 system. It may in some cases be more expeditious to execute commands to perform some of the actions.</p>
<b>Start</b>	<p>WMPartitions.Open ~ The window shows by and large the same information as explained in the section Installer followed by a row of buttons [Show Details] [Refresh] [FSTools] ... A mouse click on one of them reveals detail capabilities on a couple lines underneath. The tables below explain how to proceed. When the window opens, [FSTools] is selected offering to mount/unmount a partition. The user must then <i>select a partition</i> to operate on. By inspecting the partition type, A2 fills the FileSystem field and reveals the partition prefix or suggests one if none is assigned yet.</p> <p>WinAos: No partition will normally be shown, but virtual disks may be created and partitioned.</p> <p><b>Shortcut:</b> Main menu → Files → Partitions</p>
<b>Stop</b>	<p>Close the window. To clean up: SystemTools.Free WMPartitions WMPartitionsComponents WMPartitionsPlugins ~</p>
<b>Restorable</b>	Yes
<b>Data file</b>	WMIcons.tar



## Show Details

Toggle between showing only a list of the accessible volumes or a list showing all the partitions existing on each volume.

## Refresh



Refresh the information after having attached/detached volumes.

## FSTools

### Pre-condition (fulfilled with a correct Customization of A2)

Mount requires information on how to mount a specific FS, information which is extracted from the "Files" section of Configuration.XML.

Mount	Mount the selected partition under the condition that it hosts a supported file system (see below). A2 applications have access to the hosted files. The Flags column shows the partition state: [M] for Mounted.
Unmount	Unmount a mounted partition. A2 takes care of updating all open files. Make sure to unmount removable devices, e.g. USB flash drives, before removing them.
Force	Set the check box prior to unmount to force the unmount.

Supported file systems FS	
AosFS	The central FS of A2 accepting 128-byte file names. AosFS limits: Block size: 512 bytes Sector size: 4096 bytes Max. file size: 2.0 GB Max. partition size: 282.48 GB These values can be retrieved by executing: PartitionsLib.ShowAosFSLimits ~
OldAosFS	A former A2 FS accepting 32-byte file names. The file name length was increased to 128 bytes for AosFS.
NatFS	FS of the earlier ETH Native Oberon a predecessor of A2. Not likely to be hosted by any contemporary A2 system.
RamFS	A2 internal FS residing in main storage which must not be formatted. Use as temporary file storage that will be deallocated when A2 is terminated. This technique is used by the Installer.
FatFS	Early Windows and DOS file systems which can be mounted and accessed: FAT12 - partition type 1 - DOS 12-bit FAT16 - partition type 4, 6, 14 – DOS 3.0 16-bit FAT32 - partition type 11, 12 – Win 95 It is thus possible to exchange files between A2 and a mounted Windows partition and even to access and edit windows files in A2. Long names are supported. Enclose long names containing spaces or characters that are invalid in A2 in quotes.
IsoFS	ISO 9660 FS found on CD-ROMs and in particular a live CD. Always shown as (Whole disk) not partitioned. A live CD which is the boot volume is automatically mounted and cannot be unmounted. It may also not be removed before the end of a session. The only meaningful operations on such a volume are Eject and ShowBlocks.  A live CD which is not the boot volume, cannot be mounted/unmounted in this framework. These commands must be used instead: FSTools.Mount prefix AosFS #0, R ~ FSTools.Unmount prefix ~
ZipFS	FS is such that one can mount a zipped file instead of mounting a partition. To mount execute the command FSTools.Mount prefix ZipFS fileName.zip ~ Earlier, Native Oberon could be booted from a diskette containing a stripped down, compressed kernel, in this way.

RelativeFileSystem	In WinAos, a subdirectory can be mounted by executing the command FSTools.Mount prefix RelativeFileSystem ./ ~ resulting in mounting the A2 subdirectory Work as "prefix" which then appears as FS in the File Manager.
SmbFS	Samba FS.

## Partitions

Create	Create a <i>primary partition</i> in the unallocated space which must be selected first. A maximum of 4 primary partitions may exist (in the MBR, the only partition table A2 can modify), and only 3 when an extended partition already exists. A2 may be installed in an extended partition but neither an extended partition nor a logical drive in an extended partition can be created with A2. Use a CD bootable Linux like Parted Magic, GRML or Knoppix as a commercial application, Partition Magic for example, for that purpose or use an existing free partition and change its type before formatting it. The Flags column shows the partition state: [P] for Primary. Unallocated space is also flagged [P].
Delete	Delete a selected partition. The space becomes unallocated space.
Format	Format the selected partition, installing an AOSFS and an A2 BootLoader making the partition bootable. The kernel and further A2 software may then be installed.
ChangeType	Change the partition type of the selected partition from the current type (e.g. "6" for a DOS partition) to the new type (e.g. "76" for an AOSFS) that is entered in a dialog box. After that, a file system must be established with "Format". Use after creating a partition with another OS, or for reusing an existing free partition. Changing the partition type can make it inaccessible to other OSes! An accidental type change can be reverted as long as the partition is left unchanged.
FromFile	Extract data from a named file and write the data into a number of blocks of the selected partition starting at a specified offset (dialog box).
ToFile	Write a number of blocks of the selected partition to a named file starting at a specified offset (dialog box).
Activate / Deactivate	Set/reset the activate flag for the selected partition. The Flags column shows the partition state: [B] for Bootable when active. This flag is used only when a "simple" MBR is installed, and ignored when a boot manager is used.
Eject	Eject a removable device. Select the #0 partition which is marked (Whole disk).
ShowBlocks	Display, in hexadecimal and in characters 16 bytes per line, the contents of a number of 512-byte blocks starting at a given block number (dialog box). Note: An IsoFS inspection reveals that a block is 4 x 512 bytes long.
Check	Verify the readability of the sectors of a selected partition (of any type) and show the progress.
WriteMBR	Write a simple MBR into block with LBA=0 of a volume by selecting the line suffixed #0 and with partition type 256 (Whole disk). This is a special A2 MBR behaving exactly like the simplest Windows MBR used when no boot manager is installed. !!! Be extremely cautious when undertaking to overwrite the MBR of the boot volume especially when a boot manager such as that of Windows, GRUB or else is already installed. A working system may become totally inaccessible. It is recommended to save the existing MBR by first executing ToFile (see above) to save the MBR in a file outside of the boot volume, for example on a removable USB flash drive.
Benchmark	

## Scavenger

Scavenger and format a FatFS. Similar to Windows' Scandisk.

## Bluebottle

Config	Display the configuration data of the selected A2 partition in a special editor where the configuration strings can be edited and written back to disk, ready for the next A2 start. See <a href="http://www.ocp.inf.ethz.ch/wiki/Documentation/Configuration">http://www.ocp.inf.ethz.ch/wiki/Documentation/Configuration</a>
Update BootLoader	Install the A2 BootLoader at the beginning of the selected A2 partition. The BootLoader is automatically installed in a new installation. Only useful when upgrading an existing A2 system thus not wanting to format the partition.
Update BootFile	Install the A2 BootFile in the selected A2 partition, in order to make the partition bootable by installing a statically linked image of: the dynamic module loader a number of core modules the AosFS file system at least one disk driver, that is the driver corresponding to the disk controller to which the boot device will be attached. One also refers to it as A2 kernel and these files are included in a build: IDE.Bin – supports P-ATA (IDE, EIDE, ATAPI) and S-ATA USB.Bin – supports only USB high speed EHCI so as to keep the kernel below its maximal size. The low UHCI and full OHCI speed drivers can be loaded when A2 is already up and running as the need arise. SCSI.Bin – for legacy hardware not widely used was neither updated neither tested and probably not usable
Install BootManager	Install the A2 BootManager in the reserved volume space below LBA=63. Select the volume line suffixed #0 and with partition type 256 (Whole disk). Two file names are offered in a dialog box: the first file contains the MBR that will be replace the current MBR, the second one contains the tail and longer part of the BootManager. See <a href="http://www.ocp.inf.ethz.ch/wiki/Documentation/BootManager">http://www.ocp.inf.ethz.ch/wiki/Documentation/BootManager</a>

## Tests

Write Test Data	
Verify Test Data	
Test Partition	
Write Zeros	Write zeros in all blocks of the selected partition. Specify the number of blocks per transfer (dialog box).

## Operation

Obtain details of the execution of the selected operation.

## Partition editor – GUI

Partition Table Editor

Device: TEST Block (LBA): 0 Load Store Clear

	Flag	Type	Start				End				Size
1	0	76	63	0	1	1	163547	648	3	63	163485
2	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
			LBA	C	H	S	LBA	C	H	S	

<b>Usage</b>	Inspect and verify, and in rare cases edit, partition table entries.
<b>Start</b>	<p>PartitionEditor.Open ~ opens a window as shown above, displaying the contents of the four partitions entries in the partition table in a block, under the condition that the specified block number is well chosen. Use the Partition tool information to locate the 1<sup>st</sup> block of a partition.</p> <p>Device: enter the device name, for example IDE1, then  Block (LBA): 0 - is for sure the MBR of a volume  Block (LBA): xzy choose it well as 1<sup>st</sup> block of an extended partition or of a chained partition (has two occupied entries out of 4)  and press "Load".</p> <p>Unless you know what you are doing, use neither "Clear" nor "Store" to avoid a catastrophe.</p> <p>The command may also be used with a virtual disk created in WinAos.  Multiple windows may be opened.</p>
<b>Stop</b>	<p>Close the window(s).  To clean up: SystemTools.Free PartitionEditor PartitionEditorComponents ~</p>
<b>Restorable</b>	Yes

## Desktop navigation

The concept of view port is used with reference to the conceptual raster (see Virtual desktop):

- To enhance navigation:
  - in the WMNavigate.SetViewportRange command to precisely pinpoint individual view ports of any size. These commands are used by HotKeys.
  - in the WMNavigator.Open command to pinpoint 6 individual view ports around a view port as a group.
  - In the WMBackdrop.AddBackdropImage --fullscreen ... ~ command to set a backdrop image for a view port.
- In the screenshot utility, a portion of the virtual desktop, defined by a view port, is captured in a file.

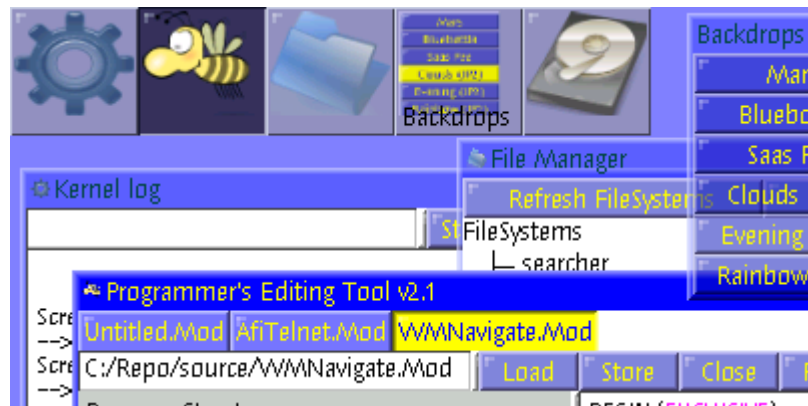
### Multiple backdrops for navigation

An interesting navigation technique is obtained by installing multiple backdrop images on the virtual desktop as described in the section "Backdrop installer".

### Virtual desktop navigation - GUI

Each window inserted on the virtual desktop can be considered a task and many such task

windows may exist, making it difficult to keep an eye on all of them. To localize the many windows up to 10 window overviews or compact task lists, can be inserted on the desktop. An overview consists of a juxtaposition of window icons each of which is a representation of a window type, the window icon which is normally inserted at the left of a window title bar. When the task window title bar has no window icon, the title text appears instead.



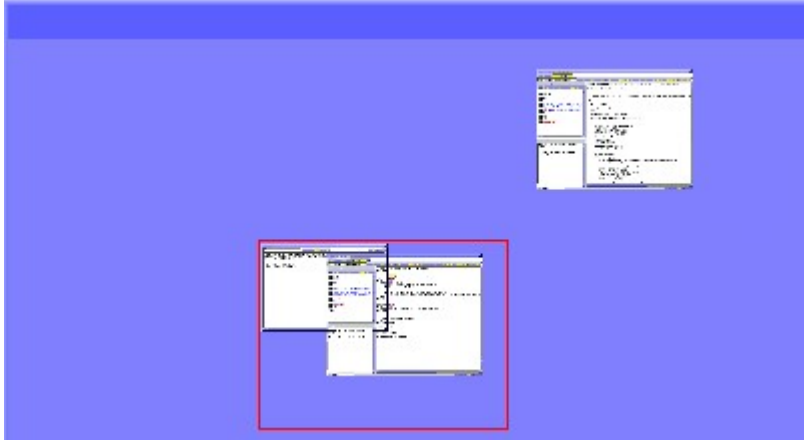
[ WMScreenShot.SnapShotRange test.bmp 400 200 0 0 ~ ]

<b>Usage</b>	A task bar showing the task windows open in the specified view port.
<b>Start</b>	<p>WMNavigate.Open [options] id x y componentFile ~  options  “-f”, “--frame” : frame the window to include a “Close” button. By default the window is not framed and the window can be hidden, restored or removed by executing one of the commands listed below.  “-s”, “--stayOnTop” : stay on top of other windows  “-v”, “--viewport” : view port</p> <p>id : unique identifier <math>0 \leq id \leq 10</math>, declared in MaxNavigationWindows  x, y : position of the window's upper left corner  componentFile : the window content depends on this file which is either WMNavigateOverview.XML or WMNavigateTaskList.XML.</p> <p>Example above:  The task bar shows five application windows in the standard view port:  Kernel log, PET, File manager, Backdrops, Partition tool</p> <p>A ML or MM click on a task bar icon activates and places the associated window on top and the icon is darkened.  A MR click on an icon opens a pop-up menu offering these choices:  Close : close the associated window  Visible : toggle between window visible and invisible (see yellow bar)  StayOnTop : force the window to stay on top</p> <p>When the window icon denotes a PET window (buzzing bee), a list of the open files appears in the lower part of the pop-up menu. A click on the file name gives direct access to editing the text (usually a source text in development).</p> <p><b>Command setting the view port size:</b>  WMNavigate.SetViewportRange [options] [x y [w h]] ~  options  “-s”, “--showTransition” : show the transition to another view port progressing  “-d”, “--display” : interpret x, y, w and h as multiples of the display width and height</p>

	<p>x, y : coordinates of upper left corner of view port w, h : width and height of view port in pixels (effective display width and height are used if omitted).</p> <p>Examples of parameters for some view ports:</p> <table> <tr> <td>View port above at the left -sd -1 -1 1 1</td><td>View port above -sd 0 -1 1 1</td></tr> <tr> <td>View port at the left -sd -1 0 1 1</td><td>Standard view port -sd 0 0 1 1</td></tr> </table> <p>The rectangle's center is considered to have the coordinates 0, 0 and corresponds to the upper left screen corner when the zoom level is 1:1.</p> <p>All four view ports together: -sd -1 -1 2 2 ~ equivalent to zoom factor 0.5</p> <p><b>Hints:</b></p> <ol style="list-style-type: none"> <li>To bring back the standard view port on the screen, use WMNavigate.SetViewportRange -sd 0 0 1 1 ~</li> <li>To restore the desktop to the state it had after A2 started, use: WMRestorable.Load Auto.dsk ~</li> </ol> <p><b>Commands acting on all task lists:</b> WMNavigate.HideNavigation ~ WMNavigate.RestoreNavigation ~ WMNavigate.ToggleNavigation ~</p> <p><b>Command acting on a single task list:</b> WMNavigate.ToggleVisibility id ~</p> <p><b>Commands acting on all windows, not on task lists:</b> WMNavigate.HideAll ~ WMNavigate.RestoreAll ~ WMNavigate.ToggleAll ~</p> <p><b>Commands acting on a single window, the one owning the focus:</b> WMNavigate.MoveWindow [-d] [x [y]] ~ options “-d”, “--display” : interpret x and y as multiples of the display width and height Move the window relative to its current position WMNavigate.ToggleFullscreen ~ WMNavigate.CloseWindow ~</p>	View port above at the left -sd -1 -1 1 1	View port above -sd 0 -1 1 1	View port at the left -sd -1 0 1 1	Standard view port -sd 0 0 1 1
View port above at the left -sd -1 -1 1 1	View port above -sd 0 -1 1 1				
View port at the left -sd -1 0 1 1	Standard view port -sd 0 0 1 1				
<b>Stop</b>	WMNavigate.Close id ~ Close window with specified id number. To clean up: SystemTools.Free WMNavigate ~				
<b>Data files</b>	WMNavigateIcons.tar WMNavigateOverview.XML, WMNavigateTaskList.XML				

## Navigator - GUI

<b>Usage</b>	Move around windows in an area larger than the screen.
<b>Start</b>	WMNavigator.Open ~

	 <p>[ WMScreenShot.SnapShotRange test.bmp 400 220 0 0 ~ ]</p> <p>The Navigator presents in its window, sized 400*200 pixels, an overview of approximately 2*3 view ports in which the current view port is easily localized by the thin red line surrounding it. The contained windows are scaled down, just to the limit of being recognizable for manipulating them as follows:</p> <p>Pressing ML on a mini-window and dragging moves it and its real counterpart simultaneously. The z-order of windows is not altered. A move can cause to loose sight on the counterpart as it crosses the screen border and moves beyond it. Conventional desktop navigation would require several elementary moves to reshuffle windows as easily as here. Note that backdrop images can likewise be moved around.</p> <p>Conversely, moving and resizing real windows is immediately reflected in the Navigator. Likewise, desktop navigation operations are reflected with a possible displacement of the thin red line locating the standard view port.</p> <p>A Meta+ML click on the Navigator brings the standard view port back on the screen (useful when lost in the blue).</p> <p>The Navigator remains anchored at the same position on the screen during the manipulations. However, it can be moved and resized.</p> <p>Note: unframed windows are not shown.</p> <p>The Navigator is placed and remains on top of all windows. It is framed but has no hot-spot in the title so that it cannot be closed except with a Close command or by unloading the module.</p>
<b>Stop</b>	WMNavigator.Close ~ Closes the Navigator. To clean up: SystemTools.Free WMNavigator ~

## Screen shot

<b>Usage</b>	Take a screen shot of a named view port or of a view port defined by position and size, scale it and save it in a file. The saved screenshot can be viewed with: WMPicView.Open fileName ~ a command that is anyway automatically placed at the end of the Kernel log.
<b>Start</b>	WMScreenShot.SnapShotView fileName [ viewName ] [ width [ height ] ] ~ takes a screen shot of the named view, scales it to width and height, and stores it in the named file.

	<p>fileName: extension can be .bmp or gif.  viewName: has the structure "View#i" where <math>0 \leq i \leq 9</math>. "View#0" is the standard view port and may be omitted. Other view ports correspond to VNC sessions (see section "VNC client").  height (or width and height): pixels. When omitted, no scaling is done and the view size is used.</p> <p>A list of all existing view ports is obtained by executing <code>SystemTools.ListPlugins ~</code></p> <p>Examples:  <code>WMScreenShot.SnapShotView xyz ~</code>  <code>WMScreenShot.SnapShotView xyz 100 100 ~</code>  <code>WMScreenShot.SnapShotView xyz View#0 200 ~</code></p> <p><code>WMScreenShot.SnapShotRange fileName width height [(left top)   (left top width height)] ~</code>  takes a screen shot of a virtual desktop, scales it to width and height, and stores it in a file with the specified fileName – Example:</p> <p><code>WMScreenShot.SnapShotRange test.bmp 300 300 -100 -100 300 300 ~</code></p>
<b>Stop</b>	To clean up: <code>SystemTools.Free WMScreenShot ~</code>

## Desktop customization

### Menu page generator

<b>Usage</b>	Create an XML menu file from entries in the parameter list.
<b>Start</b>	<p><code>MenuPages.Generate menuFilename menuName { entry } ~</code>  entry = buttonCaption command [ backgroundColor [ hoverColor ] ]  Defines the properties of a button:  buttonCaption : choose an intuitive name  command : enclose in quotes "  backgroundColor, hoverColor : hexadecimal value of RGBA for the background color and for the color while hovering with the mouse pointer. The default values are ??  See Alpha blending.</p> <p>menuFilename : is structured as "MenuPagexy.XML" and <math>0 \leq xy \leq 99</math> keeping in mind that:</p> <ul style="list-style-type: none"> <li>- in A2, as delivered, 00,10, 20, 30, 40, 50, 60, 70, 80, 90 are used</li> <li>- a maximum of 16 menus can appear in the Main menu</li> <li>- a menu has at least 4 columns, 120 pixels wide, with 2 buttons each.</li> </ul> <p>Example:  <code>MenuPages.Generate MenuPage15.xml TestMenu</code>  Hello "SystemTools.Show Hello"  World "SystemTools.Show World"  News "SystemTools.Show News"  "" ""  Reboot "SystemTools.Reboot" 0FF000060H 0FF0000FFH  ~</p>
<b>Stop</b>	To clean up: <code>SystemTools.Free MenuPages ~</code>



## Skin loader – GUI

A skin is the look and feel of an application's graphical user interface (GUI). It is conditioned by data stored in a skin file (suffix .skin) and is customizable. The skin file describes the frame objects which decorate a window, i.e., the frame shape and color(s), the color of buttons and a set of predefined mouse pointers. A2 comes with a selection of skins, some of them are look-a-likes of third-party skins.

<b>Usage</b>	Offer to the user a list of skins to choose from and to install the selected one.																												
<b>Start</b>	<p>WMSkinLoader.Open fileName ~ fileName : the name of an XML file containing a list of skin file names and the associated name that will appear in the GUI. SkinList.XML is the only file included in an A2 release.</p> <p>A list of skins of various designs to choose from is presented. The information is extracted from the SkinList.XML file. The available skins can be classified in two design groups:</p> <p><b>Group 1</b></p> <table><tr><th>GUI name</th><th>Skin file name</th></tr><tr><td>ZeroSkin</td><td>ZeroSkin.zip This was the original A2 look and is generated by program without skin file.</td></tr><tr><td>Reptile</td><td>reptile.skin</td></tr><tr><td>Kramer</td><td>pklook.skin</td></tr><tr><td>Traditional</td><td>traditional.skin</td></tr><tr><td>XP</td><td>winxp.skin (look-alike of Win XP)</td></tr><tr><td>OSX</td><td>aqua.skin (look-alike of Mac OSX)</td></tr><tr><td>Glass</td><td>glass.skin</td></tr><tr><td>StijnBW</td><td>stijnbw.skin</td></tr></table> <p><b>Group2 using a so-called FancyStartMenu.</b></p> <table><tr><th>GUI name</th><th>Skin file name</th></tr><tr><td>Blue</td><td>BluePlastic.skin</td></tr><tr><td>Red</td><td>redlook.skin</td></tr><tr><td>Stijn</td><td>stijn.skin</td></tr><tr><td>Christmas</td><td>xmas.skin</td></tr></table> <p>The “Glass” and “Stijn” skins were designed by Stijn Ossevoort, a Dutch freelance designer <a href="http://www.linkedin.com/in/sostechologydesign">http://www.linkedin.com/in/sostechologydesign</a> Pronounce “stijn” as “stine” (english) or “stein” (german but with “s”, not “sch”). The “StijnBW” skin is derived from “Stijn” by Sven Stauber.</p> <p>The list is limited to only 11 files, plus ZeroSkin, but it is customizable. A ML, MM or MR mouse click installs the skin. Behind the scene a SkinEngine.Load command is executed that installs the selected skin (see the next section “Skin engine”).</p> <p><b>Shortcut:</b> Main menu → Looks → SkinLoader</p>	GUI name	Skin file name	ZeroSkin	ZeroSkin.zip This was the original A2 look and is generated by program without skin file.	Reptile	reptile.skin	Kramer	pklook.skin	Traditional	traditional.skin	XP	winxp.skin (look-alike of Win XP)	OSX	aqua.skin (look-alike of Mac OSX)	Glass	glass.skin	StijnBW	stijnbw.skin	GUI name	Skin file name	Blue	BluePlastic.skin	Red	redlook.skin	Stijn	stijn.skin	Christmas	xmas.skin
GUI name	Skin file name																												
ZeroSkin	ZeroSkin.zip This was the original A2 look and is generated by program without skin file.																												
Reptile	reptile.skin																												
Kramer	pklook.skin																												
Traditional	traditional.skin																												
XP	winxp.skin (look-alike of Win XP)																												
OSX	aqua.skin (look-alike of Mac OSX)																												
Glass	glass.skin																												
StijnBW	stijnbw.skin																												
GUI name	Skin file name																												
Blue	BluePlastic.skin																												
Red	redlook.skin																												
Stijn	stijn.skin																												
Christmas	xmas.skin																												

	Alternatively, a skin can be installed using the "File manager" (refer to that section).
<b>Stop</b>	Close the window. To clean up: SystemTools.Free WMSkinLoader Looks ~
<b>Data files</b>	SkinList.XML and all of the files appearing in the table above.

Soren Renner, an OCP participant, developed srskin.skin, adapted from Thomas Frey's traditional.skin.

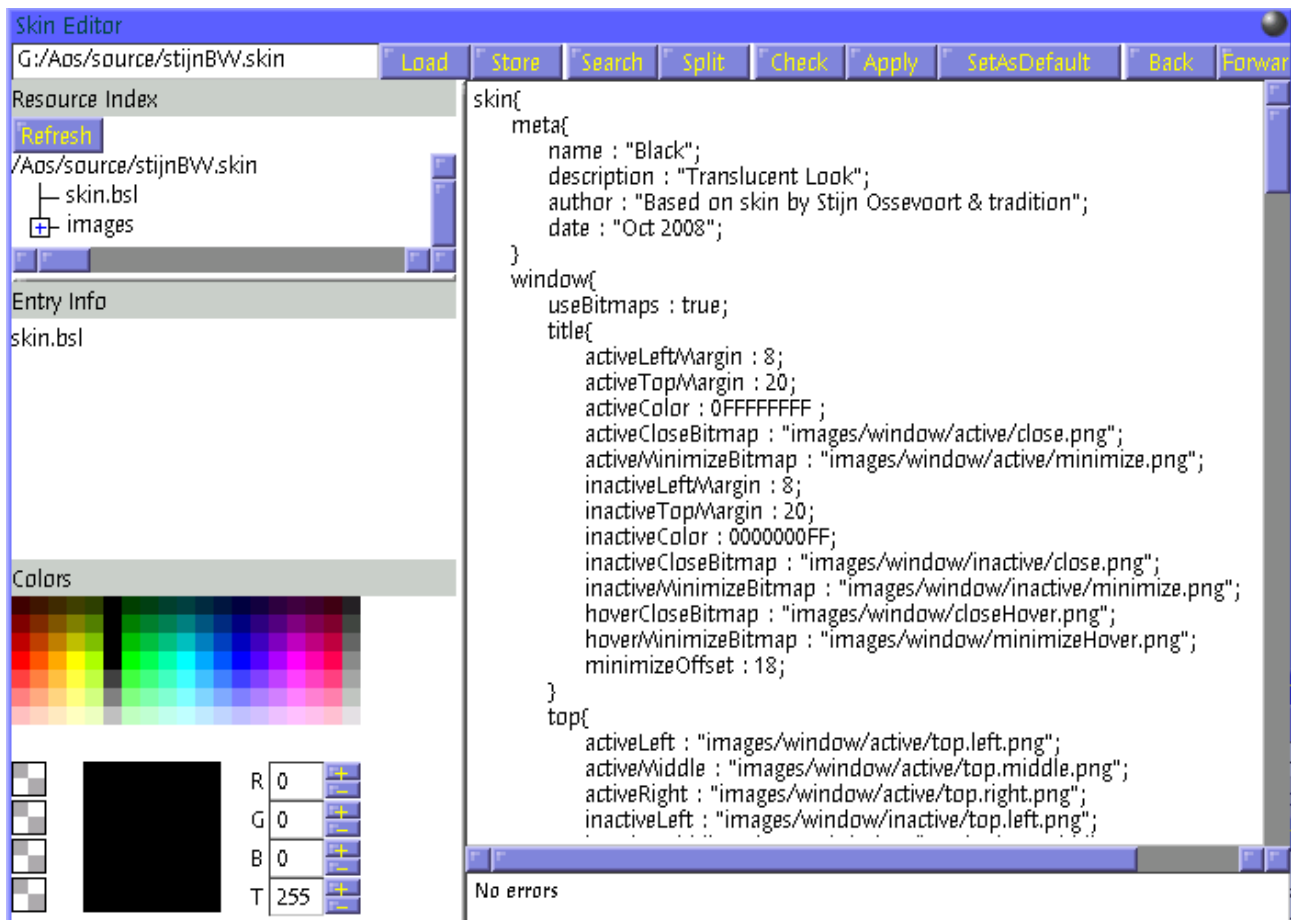
## Skin engine

<b>Usage</b>	Install a skin either <i>temporarily</i> , or <i>permanently</i> in Configuration.XML. Instead of using one of the commands described in „Start, one can: 1. use the Skin loader offering a choice of skins to install temporarily 2. or edit the Autostart section in Configuration.XML: <b>either</b> install the desired skin automatically when A2 starts with: <Setting name="DefaultSkin" value="SkinEngine.Load xyz.skin"/> <b>or</b> install the programmatic ZeroSkin <Setting name="DefaultSkin" value="SkinEngine.Unload"/> <b>or</b> comment out such a line (equivalent to Unload") <!-- Setting name="DefaultSkin" value="Skin .... " / ->
<b>Start</b>	SkinEngine.Load fileName ~ Install the specified skin <i>temporarily</i> . Alternatively, a skin can be installed using the "File manager" (refer to that section).  SkinEngine.Unload ~ Install the original ZeroSkin.zip which uses no skin file.  SkinEngine.SetCurrentAsDefault ~ Register <i>permanently</i> the current skin in the Autostart section of Configuration.XML. This skin will be used the next time A2 starts.
<b>Stop</b>	To clean up: SystemTools.Free SkinEngine ~

## Skin editor - GUI

<b>Usage</b>	Skins are stored in files, with the extension .skin, containing a description text, entitled skin.bsl, written in BSL (Bluebottle Skin Language), and images or bitmaps for use in the composition of visual components. SkinTutorial.Text is only a short introduction to the subject. This application is destined to experienced designers and one should refrain from modifying skins without good knowledge.
<b>Start</b>	SkinEditor.Open [fileName] ~ Open the named skin file for editing.  Whenever a good skin is finalized, add it to the SkinList.XML file in order to let it appear the next time the "Skin loader" application is started.  <b>Shortcut:</b> Main menu → Looks → SkinEditor  Several skin editors may be running in parallel.
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free SkinEditor SkinEngine FNHistories SkinLanguage ~

<b>Restorable</b>	Yes
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[ WMScreenShot.SnapShotRange test.bmp 700 500 0 0 ~ ]

Control buttons at the top	
<b>Load</b>	Open the skin file for editing. The tree structure of skin appear at the left.
<b>Store</b>	Save the edited data in a skin file
<b>Search</b>	Search and replace text string
<b>Split</b>	Open a second text view
<b>Check</b>	Check that the skin description is syntactically correct. Errors are listed in the reporting area at the bottom right. In the absence of errors, „No errors“ is reported.
<b>Apply</b>	Check the correctness and install if correct
<b>SetAsDefault</b>	Behind the scene execute SkinEngine.SetCurrentAsDefault ~
<b>Back</b>	Undo
<b>Forward</b>	Redo
<b>Tutorial</b>	Open the tutorial
<b>Config</b>	Open the SkinConfig.XML file for editing

## Bluebottle Skin Language (BSL) definition

The information stored in a .XML file describes the values to assign to properties of the visual components used in the composition of the GUI and has 4 parts, starting with meta data:

```
skin{
  meta{
    name : "<skin name>";
    description : "<skin description>";
    author : "<author name>";
    date: "<creation date>";
  }
  window{ ... window frame definition
}
  cursor{ ... cursor definition
}
  component{ ... GUI components definition: button, scrollbar, etc.
}
}
```

### ***Backdrop loader - GUI***

<b>Usage</b>	Offer to the user a list of desktop backdrops to choose from and to install the selected one.														
<b>Start</b>	<p>WMBackdropLoader.Open fileName ~ fileName : the name of an XML file listing the names of files containing images that are suitable for placing on the desktop and the associated name that will appear in the GUI. BackdropLoader.XML is the only file included in an A2 release.</p> <p>A list of desktop backdrops of various designs to choose from is presented. The information stored in the current BackdropList.XML file is:</p> <table><tr><th>GUI name</th><th>File name</th></tr><tr><td>Mars</td><td>mars.png</td></tr><tr><td>Bluebottle</td><td>BluebottlePic0.png</td></tr><tr><td>Saas Fee</td><td>SaasFee.jpg</td></tr><tr><td>Clouds (JP2)</td><td>Clouds.jp2</td></tr><tr><td>Evening (JP2)</td><td>Evening.jp2</td></tr><tr><td>Rainbow (JP2)</td><td>Rainbow.jp2</td></tr></table> <p>The list is limited to 6 files only but it is customizable. A ML, MM or MR mouse click installs the backdrop. Behind the scene a WMBackdrop.AddBackdropImage filename ? ? ? ? ~ command is executed that installs the selected backdrop. Refer to the next section "Backdrop installer" which also explains which other image files are suitable.</p> <p><b>Shortcut:</b> Main menu → Looks → Backdrops</p> <p>Alternatively, a backdrop can be installed using the "File manager" (refer to that section).</p>	GUI name	File name	Mars	mars.png	Bluebottle	BluebottlePic0.png	Saas Fee	SaasFee.jpg	Clouds (JP2)	Clouds.jp2	Evening (JP2)	Evening.jp2	Rainbow (JP2)	Rainbow.jp2
GUI name	File name														
Mars	mars.png														
Bluebottle	BluebottlePic0.png														
Saas Fee	SaasFee.jpg														
Clouds (JP2)	Clouds.jp2														
Evening (JP2)	Evening.jp2														
Rainbow (JP2)	Rainbow.jp2														
<b>Stop</b>	Close the window. To clean up: SystemTools.Free BackdropLoader Looks ~														
<b>Data files</b>	BackdropList.XML and the listed file names														

## Backdrop installer - GUI

<b>Usage</b>	<p>Install a backdrop image at a specified location on the virtual desktop. For better visual orientation and organization it is possible to place different backdrops on the desktop that can serve to group task windows into projects. Apart from serving as decoration and visual clues, backdrops (a backdrop is a variant of a task window) can be navigated to with a ML click, whenever they are visible. Remember that the entire setup of the desktop can be saved persistently on demand (see section "Desktop save/restore").</p>
<b>Start</b>	<p><b>Install a backdrop relative to the <i>current</i> view port in the conceptual raster:</b>  WMBBackdrop.AddBackdropImage [options] fileName x y ~  options  "-f", "--fullscreen" : scale the image to full screen, else use the image size</p> <p>fileName : see below  x : abscissa upper left  y : ordinate upper left image corner w.r.t. upper left view port corner</p> <p>An interesting navigation technique can be derived from this, according to this example, in concordance with the view port schema in "Virtual desktop navigation":</p> <pre>WMBBackdrop.AddBackdropImage --fullscreen BluebottlePic0.png ~ WMBBackdrop.AddBackdropImage --fullscreen mars.png 0 -1 ~ WMBBackdrop.AddBackdropImage --fullscreen SaasFee.jpg -1 -1 ~ WMBBackdrop.AddBackdropImage --fullscreen Clouds.jp2 -1 0 ~</pre> <p>Note how the images are installed first in the standard view port and from there 3 further ones counter-clockwise.  Press Meta+Home to see the four view ports and an ML click on one of the backdrop images navigates back to it.</p> <p><b>Install a backdrop at the specified position using the original image size:</b>  WMBBackdrop.AddBackdropImage fileName [ x y ] ~  fileName : see below  x : abscissa upper left image corner relative to view port  y : ordinate upper left image corner relative to view port</p> <p><b>Install a backdrop at current view port and scale the image to the port size:</b>  WMBBackdrop.AddBackdropImage fileName ? ? ? ~  fileName : see below</p> <p>fileName may have the file name extensions: .bmp, .gif, .jp2, .jpeg, .jpg, .png</p>
<b>Stop</b>	<p>Close the window.  To clean up: SystemTools.Free WMBBackdrop ~</p>
<b>Restorable</b>	Yes

## Utilities

### SystemTools

<b>Usage</b>	<p>A collection of commands giving access to system information and functions. One cannot classify them easily, since each acts on very distinct system components either the hardware or the software.</p>
<b>Start</b>	<p>The number of system commands is very large and well documented in the "SystemTools" table of <a href="http://www.ocp.inf.ethz.ch/wiki/Documentation/Miscellaneous">www.ocp.inf.ethz.ch/wiki/Documentation/Miscellaneous</a></p>

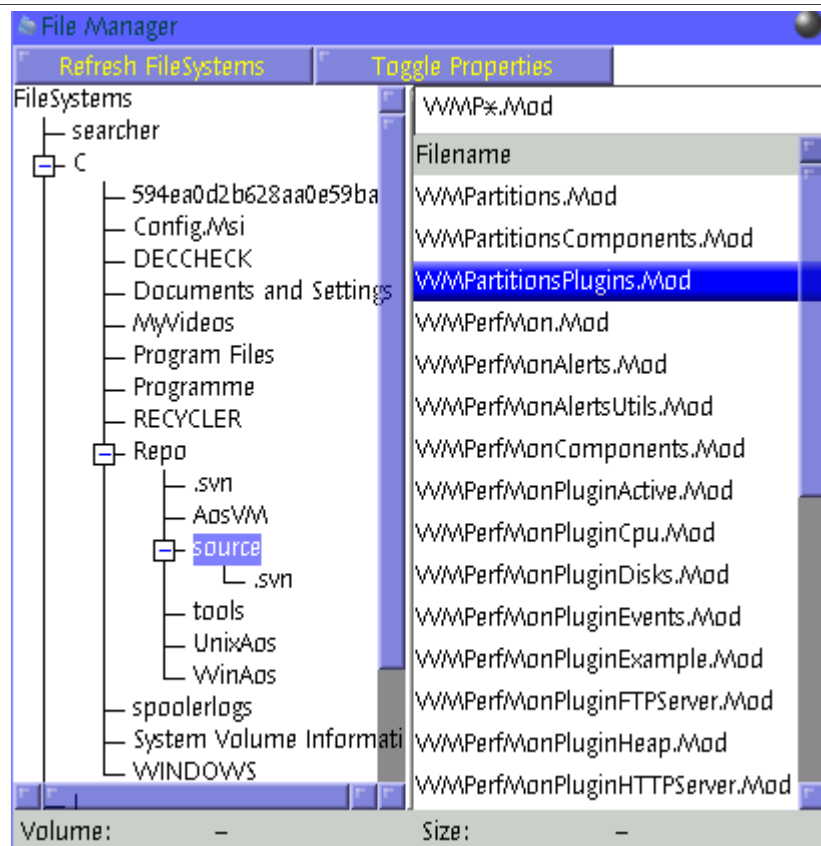
	<p>Only a few are documented here.</p> <p>SystemTools.DoCommands is special in that it accepts a list of commands as parameters where each command is delimited by a “~”. A final “~” is of course also required. Example:</p> <pre> SystemTools.DoCommands     SystemTools.Version ~     SystemTools.Time ~ ~ </pre> <p>Useful to batch commands either occasionally or for recurrent applications such as compiling the whole system. The example is edited with indents making it well readable however long the list of commands.</p> <p>SystemTools.Reboot ~ Reboot the system.  <b>Shortcut:</b> Main menu → System → Reboot</p> <p>SystemTools.PowerDown ~ Shutdown the system. The user must turn power off. A2 does not support power management.  <b>Shortcut:</b> Main menu → System → Shutdown</p>
<b>Stop</b>	Module SystemTools cannot be unloaded since it contains Free.

## Virtual keyboard - GUI

<b>Usage</b>	An application susceptible to find a use with a touch screen. Unfinished but operational.
<b>Start</b>	<p>WMKBD.Open ~</p> <p>Open a virtual keyboard that always stays on top. Set the cursor in a text editor and click with any mouse key to edit the text. The virtual keyboard keys CAPS, SHIFT, CTRL, META and ALT can all be toggled on and off.</p> <p>The keyboard description is stored in kbd.xml and can be customized.</p>
<b>Stop</b>	To clean up: SystemTools.Free WMKBD VirtualKBD ~
<b>Data file</b>	kdb.xml

## File manager - GUI

<b>Usage</b>	A file manager or file browser for operating on selections of files: edit, rename, duplicate, delete, compress and when the file contains source text, compile it.
<b>Start</b>	<p>WMFileManager.Open ~ Opens a two-part panel with at the left the hierarchical structure of volumes, directories and sub-directories, and at the right a list of file names matching the wild card value edited in the input field at the top.</p> <p>The snapshot below is a WinAos sample.</p>



[ WMScreenShot.SnapShotRange text.bmp 410 420 0 0 ~ ]

A ML click on a file name selects the file. A subsequent MR click open a pop-up menu with a selection of buttons captioned as shown in the left column:

<b>Open</b>	the selected file with the application associated with the file name extension, as defined in Configuration.XML in the section "Filehandlers". For example, when the extension is: "mod" or "asm" the PET editor is opened, "text" or "txt" Notepad is opened.
<b>Rename</b>	the selected file
<b>Duplicate</b>	the selected file
<b>Tar</b>	compress the selected file(s)
<b>Delete</b>	the selected file(s)
<b>Compile</b>	the selected file, when the suffix is ".Mod"
<b>Set as skin</b>	the selected file, when the suffix is ".skin"
<b>Set as background</b>	The selected file, when the suffix is: .bmp, .gif, .jp2, .jpeg, .jpg, .png

The 3 last entries will only show up when the file name suffix is as declared.

To select several file names, press MM on a file name, then hold and drag the mouse upwards or downwards. When several files are selected, only "Tar" and "Delete" will show up.

**Refresh FileSystems:** collapse the file hierarchy adjusting the list after a mount

	<p>or unmount operation.</p> <p><b>Toggle Properties:</b> insert or remove file size and date at the right of the file name list.</p> <p><b>Shortcut:</b> Main menu → Files → Files</p> <p>Several file managers may be running in parallel.</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMFileManager ~</p>
<b>Restorable</b>	Yes
<b>Data file</b>	Window icon: WMIcons.tar:/WMFileManager.png

## Hot key commands

<b>Usage</b>	Three commands developed for use in hot key definitions.
<b>Start</b>	<p>HotKeysCommands.ClearLog ~ Clear the Kernel Log, even when the window is not on the desktop.</p> <p>HotKeysCommands.EnterCommand ~ Opens a blue window where a command can be entered and executed with a final ENTER. The window cannot be moved and is not persistent, i.e. disappears unless a command is entered.</p> <p>HotKeysCommands.SimulateMouse MouseX   MouseY   MouseButtons   MouseWheel value ~</p>
<b>Stop</b>	To clean up: SystemTools.Free HotKeysCommands ~

## Text converter

<b>Usage</b>	Convert a text to the Oberon text format. The Oberon text format is used for source text and has the characteristic of collecting formatting information in a header. The compiler can thus skip over the header and can therefore parse the remaining plain ASCII text faster.
<b>Start</b>	<p>TextConverter.Oberon fileName ~</p> <p>The converted text takes over the name of the input file. An acknowledgment of the conversion appears in the KernelLog, possibly with a diagnostic of what could not be converted.</p>
<b>Stop</b>	To clean up: SystemTools.Free TextConverter ~

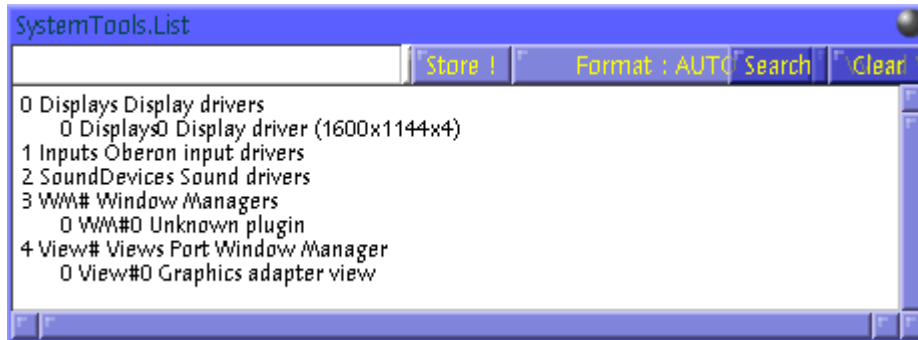
## WhitespaceRemover

<b>Usage</b>	Utility to remove white space at the end of a source text line. Is invoked with Ctrl-Del in PET by preference to executing the command described next.
<b>Start</b>	<p>WhitespaceRemover.Remove [options] (fileName { " " fileName}   fileMask) ~ options</p> <p>“-v”, “--verbose” : report the number of removals per file and terminate the file list with a line of statistics.</p> <p>Remove white spaces (“ ”, TAB, LF, CR) at the end of the text lines in the files listed or in the files matching fileMask.</p>



<b>Stop</b>	To clean up: SystemTools.Free WhitespaceRemover ~
-------------	---

## WMUtilities - GUI



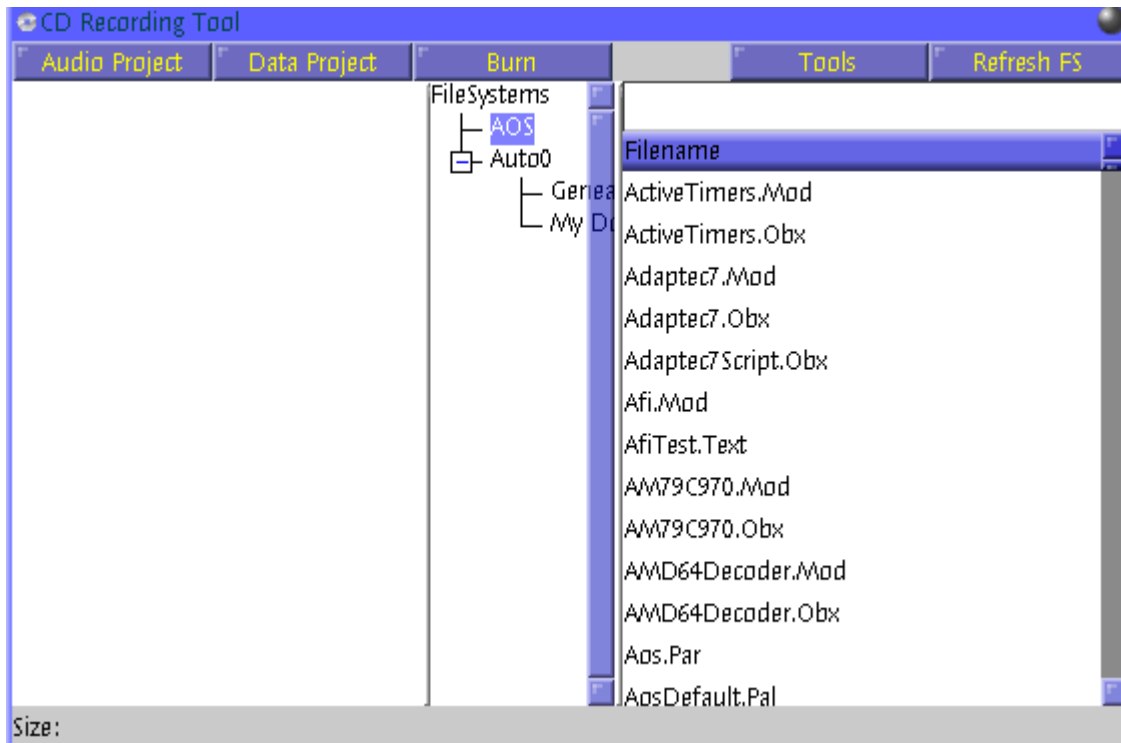
[ WMScreenShot.SnapShotRange text.bmp 460 170 0 0 ~ ]

<b>Usage</b>	A utility command for executing a command and to redirect its output to a dedicated window instead of sending it to the Kernel log..
<b>Start</b>	<p>WMUtilities.Call [options] [commandName [parameterList]] ~</p> <p>options</p> <p>    "-b", "--blocking" : force to wait the end of the output</p> <p>    commandName [parameterList] : whichever command to execute</p> <p>The data produced is directed to a dedicated window.</p> <p>The text editor in the window has the functionality of a Notepad, except for the missing "Load" button. A file name must be entered before storing the text (a warning is sent if not).</p> <p>Example: WMUtilities.Call SystemTools.List plugins ~ see picture</p> <p>Several WMUtilities may be running in parallel.</p> <p>The two commands</p> <p>    WMUtilities.TestWindow ~</p> <p>    WMUtilities.TestWindowWriter ~</p> <p>have no special function, except testing.</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMUtilities ~</p>

## Task scheduler – GUI

<b>Usage</b>	
<b>Start</b>	<p>WMTaskScheduler.Open ~</p> <p>Several task schedulers may be running in parallel.</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMTaskScheduler ~</p>
<b>Restorable</b>	
<b>Data file</b>	Window icon: WMIcons.tar://WMTaskScheduler.png

## CD recorder - GUI



<b>Usage</b>	<p>Multi-functional CD burner for two different project types: audio and data. A project must be created first.</p> <p>Audio Project: list of songs ... ??</p> <p>Data Project: with these session types</p> <ul style="list-style-type: none"> <li>No Multisession</li> <li>StartMultisession</li> <li>Continue Multisession</li> <li>Finish Multisession</li> <li>Boot</li> </ul> <p>Burn a project</p> <p>The following tools are integrated:</p> <ul style="list-style-type: none"> <li>Burn an ISO-9660 image file as produced with Isolimages for instance.</li> <li>Copy Data CD</li> <li>Blank CDRW</li> <li>Disc Information</li> </ul>
<b>Start</b>	<p>WMCDRecorder.Open ~</p> <p>Several CD recorders may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Files → CDRecorder</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMCDRecorder ~</p>
<b>Build</b>	Native only: A2, A2Mini, AMD64
<b>Data files</b>	<p>CDRecordUtils.Mod, CDRecordLib.Mod, MakeIsolimages.Mod, CDRecord.Mod, WMCDRecorder.Mod</p> <p>Window icon: WMIcons.tar://WMCDRecorder.png</p>

## Iso image file creator

<b>Usage</b>	Create a bootable ISO-9660 image file, following the El Torito specifications. The volume id is "BLUEBOTTLE" and the publisher id is ETH-ZURICH". This tool is used for producing an A2 build (see Build.Tool).
<b>Start</b>	IsolImages.Make isofileName imageName ~ The file so produced can be used for burning a CD with the WMCDRecorder or any other utility such as Nero.
<b>Stop</b>	SystemTools.Free IsolImages ~
<b>Build</b>	Native only: A2, A2Mini, AMD64

## Kernel log - GUI

<b>Usage</b>	Used by A2 to record system activity. The data is in fact produced by program statements introduced by programmers. The amount of data can be in some programs controlled by some kind of Debug constant set to TRUE or FALSE. Since the log is a simple editor, it can be used as a scratch pad for entering commands.
<b>Start</b>	WMKernelLog.Open ~  <b>Shortcut:</b> Main menu → System → Log
<b>Stop</b>	Close the window. To clean up: SystemTools.Free WMKernelLog ~
<b>Restorable</b>	Yes
<b>Data files</b>	KernelLogger.Mod WMKernelLog.Mod

## Clock - GUI

<b>Usage</b>	A transparent digital or analog clock, presented in an unframed window.												
<b>Start</b>	<p>WMClock.Open ~</p> <p>At first, a digital clock (hh:mm:ss) is presented. A ML click opens a pop-up list offering 6 choices:</p> <table border="1"> <tr> <td>Close</td><td></td></tr> <tr> <td>Time</td><td>As hh:mm:ss</td></tr> <tr> <td>Date</td><td>As dd.mm.yy</td></tr> <tr> <td>Day of Week</td><td>As letters and digits "lll dd"</td></tr> <tr> <td>Analog</td><td>A clock with a face and fingers</td></tr> <tr> <td>Toggle Color</td><td>Alternate the color black and white</td></tr> </table> <p>The analog clock face can be resized by holding MM on it, then pressing and dragging MR. Several clocks may be opened.</p> <p><b>Shortcut:</b> Main menu → System → Clock</p>	Close		Time	As hh:mm:ss	Date	As dd.mm.yy	Day of Week	As letters and digits "lll dd"	Analog	A clock with a face and fingers	Toggle Color	Alternate the color black and white
Close													
Time	As hh:mm:ss												
Date	As dd.mm.yy												
Day of Week	As letters and digits "lll dd"												
Analog	A clock with a face and fingers												
Toggle Color	Alternate the color black and white												
<b>Stop</b>	Let the pop-up window appear and click „Close“. To clean up: SystemTools.Free WMClock ~												
<b>Restorable</b>	Yes												

## Calendar - GUI

<b>Usage</b>	A transparent calendar of a month presented in a raster of 7 x 7 cells with a title, presented in an unframed window.
<b>Start</b>	WMCalendar.Open ~ At first, the current month is presented. The current day appears in red. A ML click on one of the "<" or ">" buttons framing the month name allows moving from month to month forward or backward. A MR click on the calendar opens a pop-up list offering to close the calendar, to return to the current month or to alternate colors. Several calendars may be opened.
<b>Stop</b>	Let the pop-pup window appear and click „Close“. To clean up: SystemTools.Free WMCalendar ~
<b>Restorable</b>	Yes

## Singleton overlay window for short-lived On-Screen message Display (OSD) - GUI

<b>Usage</b>	Alert the user by inserting a message during a specified number of ms inside of a blue overlay window at the top of, and as wide as, the screen. Tells which view port is visible in conjunction with hot keys F1 ... F4 (WMNavigate.SetViewportRange) and also used by WMPerfMonAlerts.
<b>Start</b>	WMOSD.Open message [ms duration] ~ WMOSD.Test ~ Perform endless self-test. To stop, unload the module. Several messages may be inserted in parallel.
<b>Stop</b>	WMOSD.Close ~ Close an open window. To clean up: SystemTools.Free WMOSD ~

## Desktop icon singleton - GUI

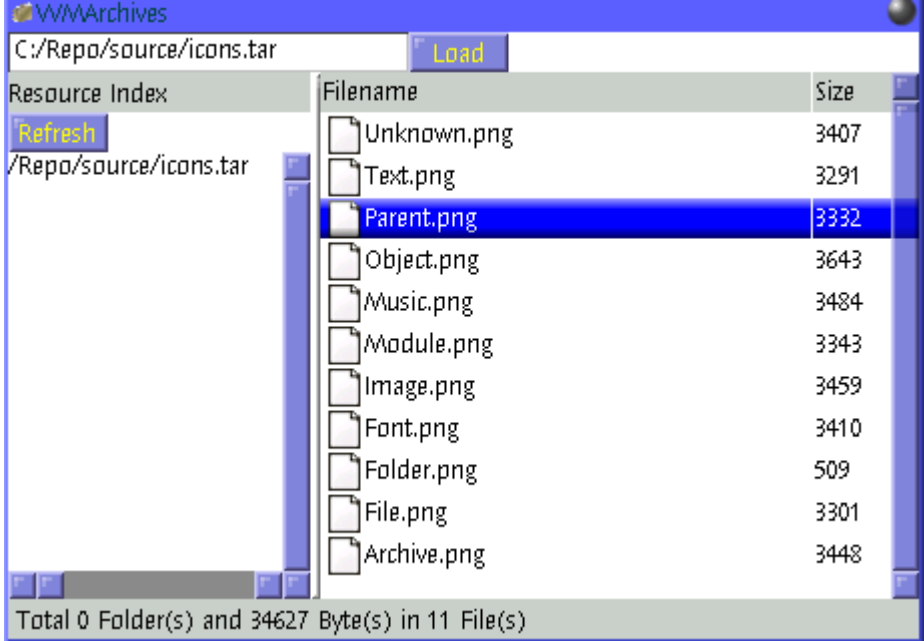
<b>Usage</b>	An expedite tool for inserting a programmable icon with limited functionality on the desktop without programming. When the desktop is not stored, the icon disappears without trace.	
<b>Start</b>	WMDesktopIcons.Open [options] ~ options "-n", "--navigation" : the window will always appear at the same position on the screen independently of the view port being displayed. "-s", "--StayOnTop" : the window will stay on top of other windows which are not already flagged as "stay on top".  The icon window which appears on the desktop is empty and has no apparent function, the window icon can be controlled with mouse clicks:	
	ML	Drag and move the window
	MR	let a pop-up menu appear offering to: Close : the window Set Command: a dialog box ask to enter a command Set Image: a dialog box asks to enter an image name, from the icons.tar collection for instance Set Caption: a dialog box asks to enter a short text
	MM	execute the command set earlier via the pop-up menu

	ML+MR	resize the window
	Several icon windows may be inserted on the desktop.	
<b>Stop</b>	Close the window(s) via the pop-up menu. To clean up: SystemTools.Free WMDesktopIcons ~	
<b>Restorable</b>	Yes	

## Display or convert a picture in a file - GUI

<b>Usage</b>	Display a picture stored in a file or convert it to another format, provided the appropriate Codec(s) is found. The available image Codecs defined in Configuration.XML are:  Decoder for: bmp, gif, png, jpeg, jpg, jp2, svg Encoder for: bmp, gif
<b>Start</b>	WMPicView.Open fileName.extension ~  WMPicView.Convert sourcefile destinationfile ~
<b>Stop</b>	To clean up: SystemTools.Free WMPicView ~

## Archives - GUI

<b>Usage</b>	A file archiving tool.
<b>Start</b>	<p>WMArchives.Open [fileName] ~ Opens a window with at the left the entire path of the file. A MM click on the name inserts at the right a list of the archived files with their size. The command is useful for files with file name extension .tar and .skin.</p>  <p>A ML click on a file name selects it. To select several contiguous names, press ML on the first name, then drag on ML downwards or upwards and release ML on the last one. A ML click on the header line de-selects all.</p>

	<p>Selected file name(s) may be copied to an open file manager by drag and drop with MM.</p> <p>Several file archives may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Tools → Archiver</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMArchives Archives ~</p>
<b>Restorable</b>	Yes
<b>Data files</b>	Window icon: WMIcons.tar://WMArchives.tar

## ZipTool

<b>Usage</b>	<p>Deflate/inflate zip archives, inspect them and add/delete entries.</p> <p>fileName: It is of good practice to suffix the file name with “.zip” (the letter case is irrelevant), but by no means compulsory. Apart from typifying the file as archive the sole added facility is that the File Manager offers the function “Extract” in the pop-up menu.</p>
<b>Start</b>	<p>ZipTool.Directory [options] fileName ~ options “-d”, “--detail” : publish detailed information on each file contained in the archive: creation date, real size in bytes, compression factor, compressed size.</p> <p>Enumerate the names of the files packed in the archive. The output information appears in the kernel log: list of the file names with or without details.</p> <p>ZipTool.ExtractAll [options] {fileName} ~ options “-d”, “--directory” : store the extracted entry in the directory ????</p> <p>“-i”, “--ignore” : ignore an error and proceed</p> <p>“-o”, “--overwrite” : overwrite an existing file with the same name as the current entry. Else, rename the existing file, adding the suffix “.Bak” and create a new file.</p> <p>“-p=”, “--prefix=destPrefix” : prefix to assign to each entry</p> <p>“-sourcePath=” srcPrefix : prefix to assign to</p> <p>“-s”, “--silent” : suppress reporting in kernel log. Else, enumerate the file names.</p> <p>ZipTool.Extract [options] fileName {entry [ “=&gt;” newName]} ~ options “-d”, “--directory” : store the extracted entry in the directory ????</p> <p>“-i”, “--ignore” : ignore an error and proceed</p> <p>“-o”, “--overwrite” : overwrite an existing file with the same name as the current entry. Else, rename the existing file, adding the suffix “.Bak” and create a new file.</p> <p>“-p=”, “--prefix=” : add a prefix to the name of the extracted entry</p> <p>entry : name of any of the files contained in the archive newName : new file name to assign to the entry</p> <p>ZipTool.Add [options] fileName {entry} ~ options “-i”, “--ignore” : ignore an error and proceed</p> <p>“-l=”, “--level=” integer - 0 means no compression 9 means best compression</p>

	<p> “-n”, “--nopath” : remove prefix and path from entry  “-r”, “--removePrefix” : remove prefix from entry (but keep path)  “-s-”, “--strategy=” integer : compression strategy 0 .. 2  “--silent” : suppress reporting in kernel log. Else, enumerate the file names. </p> <p>entry : name of any of the files contained in the archive</p> <p>ZipTool.Delete [options] fileName {entry} ~</p> <p>options</p> <p>“-i”, “--ignore” : ignore an error and proceed</p> <p>entry : name of any of the files contained in the archive</p> <p>Delete the file(s) listed as entries.</p>
<b>Stop</b>	To clean up: SystemTools.Free ZipTool ~

## Tar

Tar (derived from “tape archive”), is both a file format and the name of the program handling a file of that format. A .tar file is the concatenation of one or more files and is uncompressed. A component file can be accessed directly with this syntax:

tarFileName://componentName

Example:

<b>Usage</b>	Pack several files into a single one. Using these commands is an alternative to using Archives.
<b>Start</b>	Tar.Create fileName.tar {fileName} ~ Tar.List fileName.tar ~ Tar.Extract fileName.tar ~ For the 2 last commands, the names of the component files are enumerated in the Kernel Log.
<b>Stop</b>	To clean up: SystemTools.Free Tar ~
<b>Data files</b>	Archives.Mod, Tar.Mod

## Oberon

<b>Usage</b>	The complete Oberon system can run as one active object within a window in the display space. A special window simulates an Oberon-compatible display driver and forwards mouse and keyboard events to the Oberon loop. This allows continued use of a wealth of application programs that have been developed for Native Oberon and Plugin Oberon. In the early days of the A2 system, Oberon was used as a cross-development environment for A2 applications.
<b>Start native</b>	OberonDisplay.Install [ name ] width [ character ] height [ x y ] ~ name : window name. Default is Oberon width : window width in pixels character : a single character, conveniently “x”, as for 1280x1024 height : window height in pixels x, y : top left window corner coordinates, Default is 0 0 as is needed to start Native Oberon in full screen. Install a special window able to host a Native Oberon system.  followed by: Oberon.Call System.Init Oberon ~ to start the Native Oberon in the window.

	<b>Shortcut:</b> Main menu → Tools → Oberon or Main menu → Develop → Oberon FullScreen  OberonDisplay.Remove ~ ? OberonDisplay.SwitchToWM ~ ?
<b>Stop native</b>	Close the window or use the Main menu shortcuts to reboot or to shutdown A2. Refer to the section "SystemTools".
<b>Start WinAos</b>	OberonDisplay Install ~ compatible with the above and sufficient for starting Oberon. In full screen. The window is entitled "ETH Oberon".
<b>Stop WinAos</b>	Close the window or use the Main menu shortcuts to reboot or to shutdown A2. Refer to the section "SystemTools". Reboot and shutdown are identical.
<b>Data file</b>	Window icon: WMIcons.tar://OberonDisplay.png

## System drivers

Many hardware drivers are automatically installed when A2 is started thanks to the information (A2 commands and parameterizing data) stored at the time the system is customized - see "Customization of A2". A minimal user implication is required since at the time of an A2 installation, most of the live CD customization is taken over by the newly installed A2. The central command responsible for installing drivers is:

PCITools.DetectHardware ~ described in the section "PCITools".

Hence, some of the driver installation instructions which follow will have to be applied in a few situations only.

### ***IDE.Bin with ATA/ATAPI disks driver***

Statically linked bootable image of:

- the dynamic module loader
- a few core modules
- the AofsFS file system and
- the ATA/ATAPI disk driver

good for booting A2 from an IDE mass storage device. It is present on an A2 live CD. Once A2 is up and running, other controllers of the same type will be recognized automatically and their attached drives become accessible. USB controllers may be installed later on whenever needed.

### ***ATA/ATAPI disks driver***

<b>Usage</b>	Disk storage driver for a whole palette of controllers which evolved progressively from the early ATA protocol. Details are found in the document referred to below.
<b>Start</b>	<p>ATADisks.Install ~ Install the suitable driver software for the controller(s) detected by scanning the PCI bus, searching for class codes, or for legacy controllers not attached to the PCI bus.</p> <p>The search for controllers is directed by information located in the Configuration data – see section "Customization of A2". The details are found here:  <a href="http://www.ocp.inf.ethz.ch/wiki/Documentation/Configuration#toc14">http://www.ocp.inf.ethz.ch/wiki/Documentation/Configuration#toc14</a></p> <p>ATADisks.ShowCounter ~ output the number of IRQs and ?? in the kernel log.  ATADisks.ResetCounter ~ reset these counter.</p>
<b>Stop</b>	SystemTools.Free ATADisks ~ Execute only conditionally: not possible when the boot volume is attached to that type of disk controller.



### ***USB.Bin with high-speed USB controllers driver***

Statically linked bootable image including solely the EHCI driver, good for booting A2 on a machine that supports USB 2.0. The size of the software needed to drive the whole palette of USB controllers exceeds the size of the space originally (in the years of Oberon) reserved at the beginning of a partition. Therefore and for the time being, awaiting a better solution, the low and high speed drivers may be installed later on so as the ATA driver whenever needed.

### ***USBSLOW.Bin with low-speed USB controllers drivers***

Statically linked bootable image including OHCI and UHCI drivers, and not EHCI, good for booting A2 on a machine that does not support USB 2.0.

### ***USB hub driver***

<b>Usage</b>	Implements the Hub Driver for Universal Serial Bus Specification 2.0. <a href="http://www.usb.org">www.usb.org</a>
<b>Start</b>	UsbHubDriver.Install ~
<b>Stop</b>	SystemTools.Free UsbHubDriver ~

### ***USB OHCI low-speed driver***

<b>Usage</b>	Implements the Open Host Controller Driver Interface (HCDI) for Universal Serial Bus Specification 1.0.
<b>Start</b>	UsbOhci.Install ~
<b>Stop</b>	SystemTools.Free UsbOhci ~

### ***USB UHCI full-speed driver***

<b>Usage</b>	Implements the Universal Host Controller Driver Interface (HCDI) for Universal Serial Bus Specification 1.1.
<b>Start</b>	UsbUhci.Install ~
<b>Stop</b>	SystemTools.Free UsbUhci ~

### ***USB EHCI high-speed driver***

<b>Usage</b>	Implements the Enhanced Host Controller Driver Interface (HCDI) for Universal Serial Bus Specification 2.0. Is not required on a machine without high-speed USB 2.0.
<b>Start</b>	UsbEhci.Install ~
<b>Stop</b>	SystemTools.Free UsbEhci ~

## Serial ports set-up

Usage	Set the serial port operating parameters ahead of starting the driver.									
Start	<p>V24.Install ~ Set the operating parameters (port base address and IRQ) for up to 8 serial ports. For the two first COM ports default values are ready for use. Only in exceptional cases the data must be extracted from the configuration data, and that is necessarily so for the remaining 6 ports. The default values for the two first ports are:</p> <table><tr><th>Port</th><th>Port base address</th><th>IRQ</th></tr><tr><td>COM1</td><td>3F8H</td><td>4</td></tr><tr><td>COM2</td><td>2F8H</td><td>3</td></tr></table> <p>Execution in WinAos has no effect.</p> <p>V24.Scan ~ Scan the installed serial ports and determine their chip type. Execution in WinAos lists all ports from COM1 to COM8, telling which exist.</p>	Port	Port base address	IRQ	COM1	3F8H	4	COM2	2F8H	3
Port	Port base address	IRQ								
COM1	3F8H	4								
COM2	2F8H	3								
Stop	SystemTools.Free V24 ~									

## Serial port generic driver

<b>Usage</b>	Install a generic serial communication driver.
<b>Start</b>	<p>As soon as it is loaded, the module offers all the needed driving capabilities. The following commands help to verify the readiness.</p> <p>Serials.Show ~ Lists the available COM Ports in the Kernel log. Serials.Test ~ Test COM1 and if present COM2 with the generic driver. Serials.CloseAllPorts ~</p>
<b>Stop</b>	SystemTools.Free Serials V24 ~

## Diskette driver

<b>Usage</b>	Install a legacy diskette driver.
<b>Start</b>	Diskettes.Install ~ Install a driver for a diskette device supporting 1.44MB floppies. The Installer and the Partition framework will recognize up to 2 such devices. The machine BIOS might recognize one only or none.
<b>Stop</b>	SystemTools.Free Diskettes ~

## Virtual serial port driver

<b>Usage</b>	Simulate a data stream produced by a serial port driving an application under development which should receive data from a real serial port.
<b>Start</b>	<p>SerialsVirtual.Install ~ Install two virtual serial ports linked to each other, as would two real serial ports be linked by a null-modem cable. Data sent by one port is received by the other and vice-versa. Observe the defined port names in the Kernel Log.</p> <p>SerialsVirtual.SendFile portNbr fileName [Loop] ~ portNbr : decimal value extracted from the COMxy string appearing in the Kernel Log. fileName :</p>

	<p>Loop : send the named file endlessly. Sending can be stopped with a StopSendFile command.</p> <p>Send the content of the specified file to the specified serial port, which receives it.</p> <p>SerialsVirtual.StopSendFile ~ Stop sending.</p> <p>SerialsVirtula.InstallSniffer [portNbr] ~ Install a virtual sniffer port as proxy for the specified serial port.</p>
<b>Stop</b>	SystemTools.Free SerialsVirtual ~

## Virtual disk

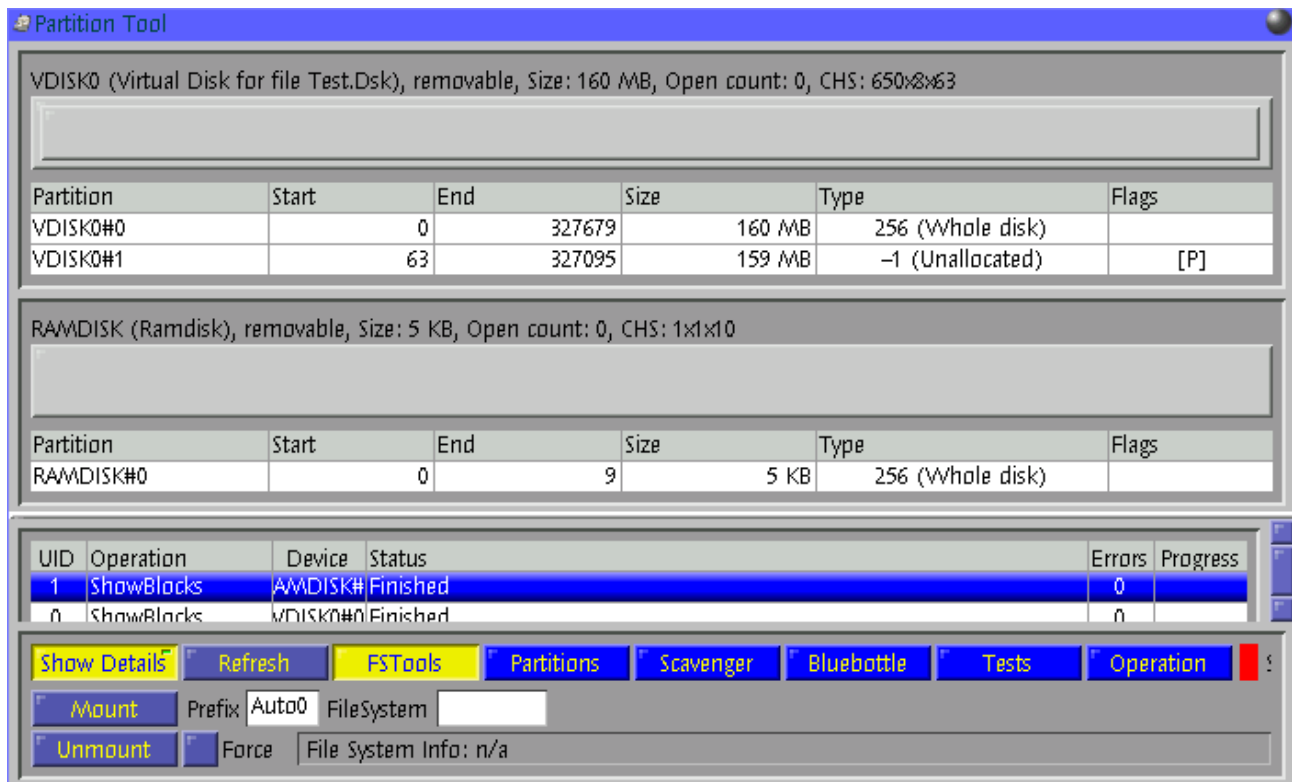
<b>Usage</b>	Create a virtual disk in a file or in RAM. For use when building A2, when A2 is hosted by Windows or Unix, or in a virtual machine environment.
<b>Start</b>	<p>VirtualDisks.Create [options] fileName nbrOfBlocks ~</p> <p>options</p> <p>“-b=”, “--blocksize=” : number of bytes - 512 by default</p> <p>Create an empty file fileName for use as virtual disk. The virtual disk is then created by executing the next command.</p> <p>VirtualDisks.Install [options] diskName fileName ~</p> <p>options define the block size and the disk geometry</p> <p>“-b=”, “--blocksize=” : number of bytes - 512 by default</p> <p>“-c=”, “--cylinders=” : integer</p> <p>“-h=”, “--heads=” : integer</p> <p>“-s=”, “--sectors=” : integer</p> <p>The 3 last options:</p> <p>a) may be omitted and are then assigned values in agreement with the file size.</p> <p>b) specific values are only needed when the geometry is relevant.</p> <p>Install fileName as file disk diskName. The disk will appear in a partition list shown by WMPartitions.Open ~ .</p> <p>The virtual disk has all the characteristics of a partitioned volume with an unallocated partition, and the user may proceed with partitioning and formatting.</p> <p>VirtualDisks.InstallRamDisk [options] diskName size ~</p> <p>options define the block size and the disk geometry (see above)</p> <p>The 3 last options:</p> <p>a) may be omitted and are then assigned the values -c=1 -h=1 -s=1.</p> <p>b) specific values are only needed when the geometry is relevant.</p> <p>Install diskName of the specified size, in 512 bytes blocks, in RAM. The disk will appear in a partition list shown by WMPartitions.Open ~ . The volume is totally empty. An MBR must be installed, the disk will be partitioned or not as needed and the partition(s) formatted.</p> <p>VirtualDisks.Uninstall diskName ~ Uninstall the virtual disk. If it was hosted by a file, the file is not deleted, and must be deleted manually.</p>
<b>Stop</b>	To clean up: SystemTools.Free VirtualDisks ~

This is the partition layout after having executed:

VirtualDisks.Create Test.Dsk 163840 ~

VirtualDisks.Install VDISK0 Test.Dsk~

VirtualDisks.InstallRamdisk RAMDISK 10 ~



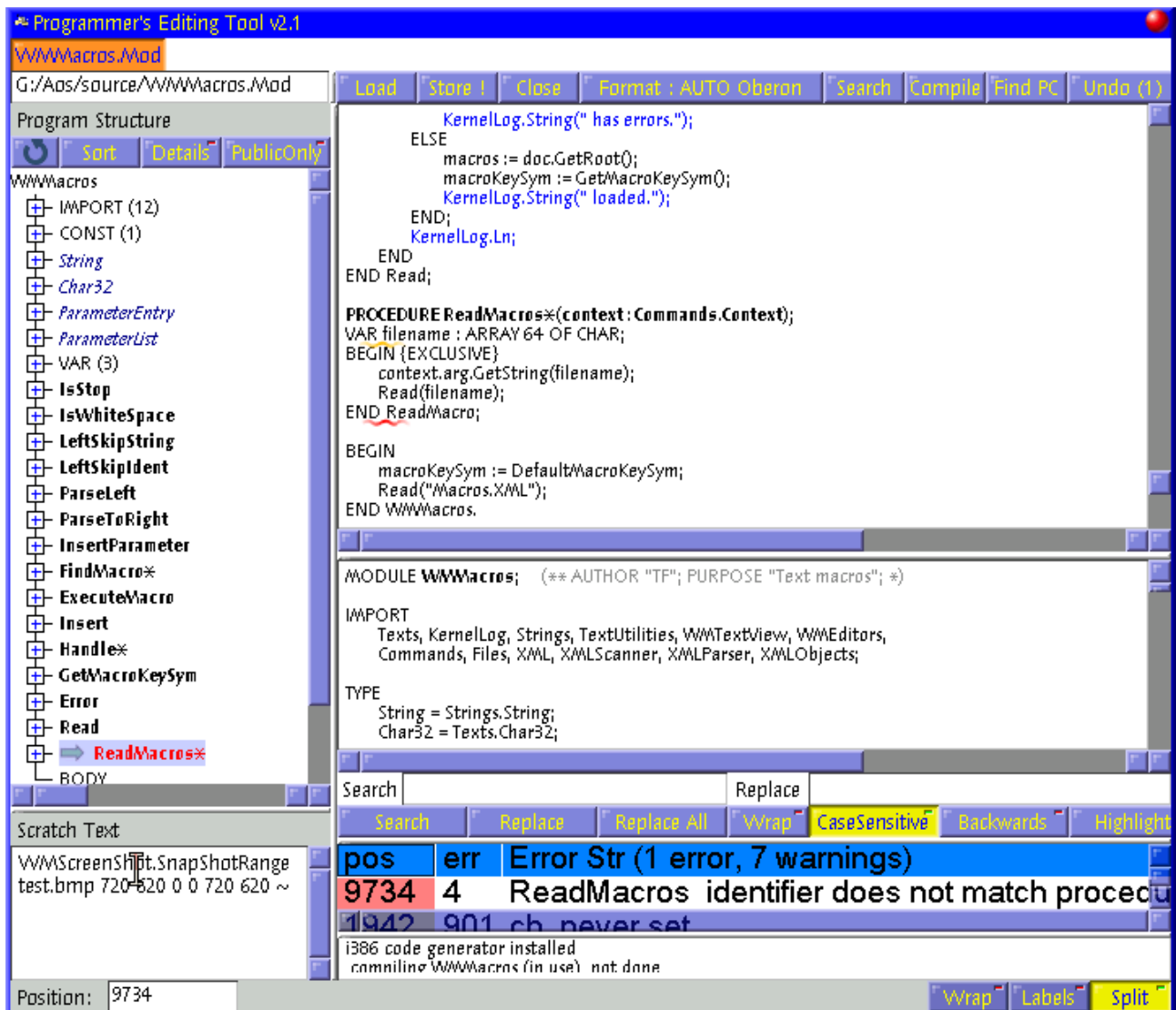
[ WMScreenShot.SnapShotRange test.bmp 700 425 0 0 ~ ]

## ***Hauppauge TV driver***

<b>Usage</b>	A driver for Hauppauge television cards.
<b>Start</b>	BT848.Install ~
<b>Stop</b>	To clean up: SystemTools.Free BT848 TVDriver ~
<b>Build</b>	Native only: A2, A2Mini, AMD64

## **Developer tools**

### ***Programmer's Editing Tool or PET - GUI***



<b>Usage</b>	The central Programmer's Editing Tool consisting of a number of standard GUI components and some glue code to integrate the compiler or the XML parser. The snapshot above is described in this table.																
<b>Start</b>	PET.Open [fileName] ~ <table border="1"> <thead> <tr> <th colspan="2">GUI widgets on top from left to right</th></tr> </thead> <tbody> <tr> <td>File name input field</td><td>Contains the file name of the program text to load or to store.</td></tr> <tr> <td>Load</td><td>Load the text from the file specified in the File name field</td></tr> <tr> <td>Store</td><td>Store the text in the file specified in the File name field. The button is marked with an "!" if the text has been changed since it was last stored.</td></tr> <tr> <td>Close</td><td>Close the currently loaded text and warns with a dialog box when the text has been changed since it was last stored.</td></tr> <tr> <td>Format</td><td>Open a menu for selecting the text format to load or store.</td></tr> <tr> <td>Search</td><td>Open a search panel for searching a string within the text.</td></tr> <tr> <td>Compile (*)</td><td>Compile the text using the compiler options specified</td></tr> </tbody> </table>	GUI widgets on top from left to right		File name input field	Contains the file name of the program text to load or to store.	Load	Load the text from the file specified in the File name field	Store	Store the text in the file specified in the File name field. The button is marked with an "!" if the text has been changed since it was last stored.	Close	Close the currently loaded text and warns with a dialog box when the text has been changed since it was last stored.	Format	Open a menu for selecting the text format to load or store.	Search	Open a search panel for searching a string within the text.	Compile (*)	Compile the text using the compiler options specified
GUI widgets on top from left to right																	
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Format	Open a menu for selecting the text format to load or store.																
Search	Open a search panel for searching a string within the text.																
Compile (*)	Compile the text using the compiler options specified																

	FindPC (*)	Search for a selected program counter position in the text. The counter value is taken from the last selection, normally in a TRAP window. If no number is selected, a query input dialog opens asking to enter a value.
	Undo (i)	Undo the last edit action. "i" denotes the total number of successive text alterations.
	Redo (i)	Redo what was last undone.
	Compiler options input field (*)	Contains the options destined to the compiler.
	(*) These disappear and are replaced by "Parse" when an XML document is loaded instead of a program text.	
	Parse	Parse the text to check the XML text correctness.
	<b>GUI widgets at the left from top to bottom</b>	
	Program structure	Displays the structure of a loaded <i>Active Oberon</i> source text. Clicking into the structural overview positions the text cursor at the respective position in the source text at the right.  If an XML document is loaded instead of a program text, the the document's structure is represented.
	Scratch text	A text tool area that is synchronized between all instances of PET. It is used to note frequently used commands. It is a good example of the model view architecture of the text system: a single text model is displayed by a possibly large number of text views.
	Several editors may be running in parallel.	
	<b>Shortcut:</b> Main menu → Develop → IDE (with empty text)	
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free PET ~	
<b>Restorable</b>	Yes	
<b>Data files</b>	PETIcons.tar	

## Macros

<b>Usage</b>	A tool destined mainly for <i>Active Oberon</i> programmers.
<b>Start</b>	<p>WMMacros.ReadMacro [fileName] ~  Readies the macro plug-in. The default fileName is Macros.XML included in a build and based on long time experience. A personal macro file may be derived from it.</p> <p>Now, position the cursor at the desired location in an editor and type a macro string according to the rules. When the macro plug-in recognizes the <i>Insert</i> key, it reads the the text at the cursor position backwards to either a white space character (space, line break or colon). The text between this white space character and the cursor position is interpreted as a macro procedure name. Hence, the number of different macros that can be invoked by the <i>Insert</i> key is not limited. The macro names and macro functions are specified in Macros.XML. They replace the macro name in the text with a larger piece of text. The larger text can either be a fixed string or a parameterized text. The macro parameters are searched in front of the macro name, each separated by a colon. The macro parameters can be inserted between fixed string elements in any order and repetition.</p>

<b>Stop</b>	To clean up: SystemTools.Free WMMacros ~		
<b>Data files</b>	Macros.XML organized in four macro groups, as suggested in these examples:		
	<b>Group</b>	<b>Macro</b>	<b>Evaluation</b>
	Mail	jg	gutknecht@inf.ethz.ch
	XML	key:t	<key></key>
		macro:T	<macro>  </macro>
	Active Oberon	test:P	PROCEDURE Test; BEGIN END Test.
	A large number of macros supplied	IME:WMInputMethods.IME:o	TYPE IME= OBJECT(WMInputMethods.IME) VAR  END IME;
		Mydoc:doc	(** AUTHOR "Mydoc"; PURPOSE ""; *)
	Greek alphabet	alpha	
	<p>The middle column specifies the unprocessed macro string with optional parameters. The right column shows text that results when the macro at the left is invoked with the <i>Insert</i> key.</p> <p>The Insert key is defined as the one that triggers the macro processing in Macros.XML as a hexadecimal value:  &lt;MacroKey keysym="FF63"/&gt;</p> <p>The specified key cannot be used for other purpose.  Use WMKeyCode.Open ~ to find out the keysym value of keys.</p>		

## HotKeys

Hot key definitions bind program functions to a single keystroke or a few keystrokes for efficiency users. It is the user's prerogative to establish such bindings in an XML file according to the following abstract syntax:

```
<!DOCTYPE HotKeys [
  <!ELEMENT HotKey ANY>
  <!ATTLIST HotKey
    name NMTOKEN #REQUIRED
    keys NMTOKEN #REQUIRED
    command CDATA #REQUIRED
  >
]>
```

Here follows a sample of concrete syntax:

```
<HotKeys>
```

```
  <!-- Standard hot keys (don't change) -->
  <HotKey name="Show Hotkeys" keys="F11" command="HotKeys.Show"/>
```

```
<HotKey name="Disable Hotkeys" keys="F12" command="SystemTools.Free HotKeys"/>
```

```
...
```

```
</HotKeys>
```

The “command=” token may list multiple commands separated by a semi-column “;”.

Warning: this tool allows definitions that can render A2 unusable. Have always a hot key bound to SystemTools.Free HotKeys.

<b>Usage</b>	Install a number of useful keyboard shortcuts (executing some commands in the background), as for example WMNavigate commands (described above) setting the view port:	
	F1 :View port above at the left	F2 :View port above
	F3 :View port at the left	F4 : Standard desktop/view port
	F5 : All these four view ports together	
<b>Start</b>	HotKeys.Open [fileName] ~ Load the hot keys definition from an XML file. The default file name is HotKeys.XML.	
	HotKeys.Show ~ Report all currently loaded hot keys in the Kernel Log, in the reverse order of the XML definition file.	
<b>Stop</b>	To clean up: SystemTools.Free HotKeys ~	
<b>Data files</b>	HotKeys.XML	

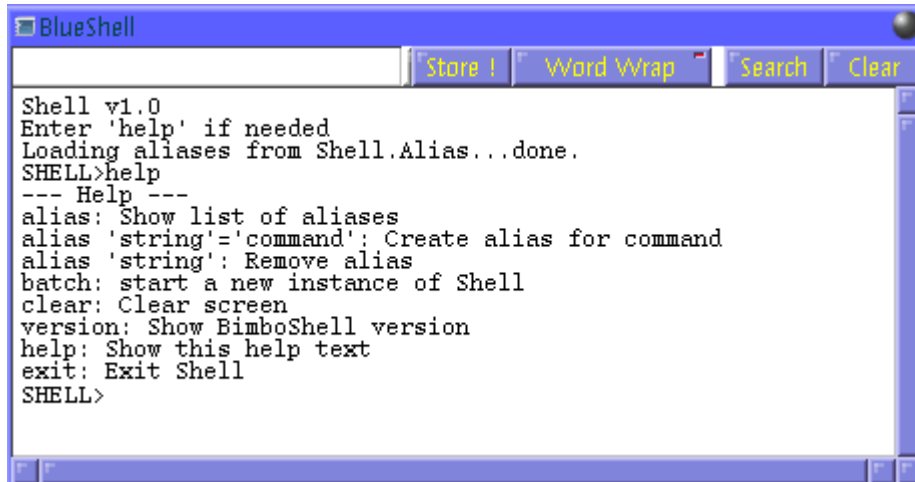
The HotKeys.XML file included proposes the following bindings:

Key stroke	Command	XML name
<b>Standard hot keys</b>		
<b>F11</b>	SystemTools.Free HotKeys	Disable Hotkeys
<b>F12</b>	HotKeys.Show	Show Hotkeys
<b>Screenshot</b>		
<b>F10</b>	WMOSD.Close;WMScreenShot.SnapShotView test.bmp;WMOSD.Open 'Screenshot saved in test.bmp'	Screenshot
<b>Start an application</b>		
<b>Meta+N</b>	Notepad.OpenEmpty	Notepad
<b>Meta+O</b>	LogWindow.Open (not for WinAos)	LogWindow
<b>Meta+P</b>	PET.Open	PET
<b>Meta+S</b>	WMShell.Open	Shell
<b>Virtual desktop control</b>		
<b>F1</b>	WMOSD.Close;WMNavigate.SetViewportRange -d -1 -1 1 1;WMOSD.Open 'Desktop 1'	Desktop 1
<b>Meta+F1</b>	WMOSD.Close;WMNavigate.SetViewportRange -d -1 -1 1 1;WMOSD.Open 'Desktop 1'	Desktop 1 (WinAos)
<b>F2</b>	WMOSD.Close;WMNavigate.SetViewportRange -d 0 -1 1 1;WMOSD.Open 'Desktop 2'	Desktop 2
<b>F3</b>	WMOSD.Close;WMNavigate.SetViewportRange -d -1 0 1 1;WMOSD.Open 'Desktop 3'	Desktop 3
<b>F4</b>	WMOSD.Close;WMNavigate.SetViewportRange -d 0 0 1 1	Desktop 4



	1;WMOSD.Open 'Desktop 4'	
<b>F5</b>	WMOSD.Close;WMNavigate.SetViewportRange -d -1 -1 2 2	Desktops Overview
<b>F6</b>	WMNavigate.HideAll	Desktops Overview
<b>F7</b>	WMNavigate.RestoreAll	Desktops Overview
<b>F8</b>	WMNavigate.ToggleAll	Desktops Overview
<b>Move the window owning the focus relative to its current position</b>		
<b>Alt+Right</b>	WMNavigate.MoveWindow 1280 0	MoveRight
<b>Alt+Left</b>	WMNavigate.MoveWindow -1280 0	MoveLeft
<b>Alt+Up</b>	WMNavigate.MoveWindow 0 -1024	MoveUp
<b>Alt+Down</b>	WMNavigate.MoveWindow 0 1024	MoveDown
<b>Switch the focus to previous/next window</b>		
<b>Ctrl+Alt+Up</b>	WMNavigate.Open -vs 6 0 0 WMNavigateOverview.XML	Open Windows Navigation
<b>Ctrl+Alt+Down</b>	WMNavigate.Close 6	Close Windows Navigation
<b>Ctrl+Alt+Right</b>	WMNavigate.FocusToNext	FocusToNext
<b>Ctrl+Alt+Left</b>	WMNavigate.FocusToPrevious	FocusToPrevious
<b>Open a window for entering and executing a command</b>		
<b>Ctrl+R</b>	HotKeysCommands.EnterCommand	Run
<b>Apply text style to selected text stretch</b>		
<b>Shift+Delete</b>	WMTextStyleTool.SetStyleByName Bold	Bold
<b>Clear the Log window</b>		
<b>Meta+Ctrl-O</b>	HotKeysCommands.ClearLog	Clear LogWindow
<b>Control window owning focus</b>		
<b>Alt+Return</b>	WMNavigate.ToggleFullScrenn	Toggle Fullscreen
<b>Alt+F4</b>	WMNavigate.CloseWindow	Close Window
<b>Simulate mouse wheel scrolling text up or down</b>		
<b>Ctrl+Up</b>	HotKeysCommands.Simulate MouseWheel -3 = scroll 3 lines up	WHEEL UP
<b>Ctrl+Down</b>	HotKeysCommands.Simulate MouseWheel 3 = scroll 3 lines down	WHEEL DOWN
<b>Key remapping</b>		
<b>Ctrl+I</b>	REMAP UP	UP
<b>Ctrl+J</b>	REMAP LEFT	LEFT
<b>Ctrl+K</b>	REMAP DOWN	DOWN
<b>Ctrl+L</b>	REMAP RIGHT	RIGHT

## Shell



```

BlueShell
Store | Word Wrap | Search | Clear
Shell v1.0
Enter 'help' if needed
Loading aliases from Shell.Alias...done.
SHELL>help
--- Help ---
alias: Show list of aliases
alias 'string'='command': Create alias for command
alias 'string': Remove alias
batch: start a new instance of Shell
clear: Clear screen
version: Show BimboShell version
help: Show this help text
exit: Exit Shell
SHELL>

```

[ WMScreenShot.SnapShotRange test.bmp 460 240 0 0 ~ ]

<b>Usage</b>	<p>The main task of a shell is to offer a command line editor where the user can type and modify a command that is interpreted according to the rules of the command interpreter when the user presses the <i>Enter</i> key. In the simplest case, the command line contains a command that is optionally followed by parameters.</p> <p>Recall that in the TUI of A2 a command can be placed within <i>any text</i>, and the likelihood of having at least an open text editor on the desktop is great, but the real power of the shell resides in possibility to glue commands together to:</p> <p><u>Redirect</u> a command output to a file, with „&gt;“  Example: Tar.List present.tar &gt; anyname.Text</p> <p><u>Redirect and append</u> a command output to a file, with „&gt;&gt;“  Example: Tar.List PETIcons.tar &gt;&gt; anyname.Text</p> <p><u>Pipe</u> a command output to another command, with „ “ (does not work!).</p> <p><u>Background command execution</u>, with „&amp;“</p> <p>When a command is entered at the prompt, the shell will wait until that command has completed before prompting again. This is called foreground processing. Only one command at a time can be running in the foreground in any shell window. Alternatively, by typing an ampersand „&amp;“ at the end of a command, it will run in background and even when the command takes some time to complete, the prompt will reappear immediately.</p> <p>Note: the same Shell module is used in Serial shell.</p>
<b>Start</b>	<p>WMShell.Open ~ The user is prompted to enter a command after „SHELL&gt;“. At the same time as the BlueShell window opens, a number of short, easy to remember, command aliases, facilitating the user's task, are extracted and loaded from Shell.Alias. Some of the abbreviated commands require valid command parameters as is described elsewhere.  To get some assistance type „help“.</p> <p>A long lasting command execution can be observed until it terminates.  For commands executed in a TUI environment, the standard output is the Kernel Log which is not always present on the desktop. In the shell, the standard output becomes the BlueShell window itself and the output can also be redirected to a</p>

	<p>file.</p> <p>One observes that more aliases can be added and removed at will to a user's preference and on-the-fly, but such changes do not alter the Shell.Alias file. The latter must be maintained with an editor. No space is allowed around the „=" in the definition of a new alias.</p> <p>Use CursorUp to retrieve earlier commands in reverse order and CursorDown to retrieve then in order. The list is organized as a round-robin.</p> <p>Several shells may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Tools → Console</p>
<b>Stop</b>	<p>At the prompt, enter "exit" followed by a carriage return.</p> <p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMSHELL Shell ~</p>
<b>Restorable</b>	Yes
<b>Data files</b>	<p>Shell.Alias</p> <p>Window icon: WMIcons.tar://WMSHELL.png</p>

### ***Search tool for searching a text stretch in a selection of files***

<b>Usage</b>	<p>Prompts to enter a search path, a selection of files specified with wild cards, and a text stretch (Content). Click „GO“. The result will appear more or less rapidly depending on the number of files to explore and the text stretch length. Each file listed can be viewed by clicking on it. It is displayed using PET.</p> <p>The search can be prematurely halted by clicking „Stop“.</p>
<b>Start</b>	<p>WMSearchTool.Open ~</p> <p>Several search tools may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Tools → Search</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMSearchTool ~</p>
<b>Restorable</b>	Yes
<b>Data file</b>	Window icon: WMIcons.tar://WMSearchTool.png

### ***Search/replace tool for a text stretch in a selection of files***

<b>Usage</b>	<p>Search all occurrences of a text stretch in all files with a name matching a given pattern, or replace these occurrences by another text stretch.</p> <p>The text stretch may not contain a carrier return.</p> <p>The names of the files where the text stretch is found are enumerated in the Kernel log.</p>
<b>Start</b>	<p>SearchTools.Find [options] filePattern searchString ~</p> <p>options</p> <ul style="list-style-type: none"> <li>“-v”, “--verbose” : terminate the file list with a line of statistics</li> <li>“-f”, “--formatted” : supply the number of hits for each file</li> <li>“-r”, “--repeated” : ??</li> </ul> <p>Search all occurrences of searchString in files with name matching filePattern.</p> <p>Example:</p> <p>SearchTools.Find -v -f E:/Repository/winaos/src/*.Mod Commands ~</p> <p>SearchTools.Replace [options] filePattern searchString replaceString ~</p>

	<p>options</p> <p>“-v”, “--verbose” : report the number of replacements per file and terminate the file list with a line of statistics</p> <p>“-r”, “--repeat” : ??</p> <p>Replace all occurrences of searchString by replaceString in files with name matching filePattern. No replacement takes place on a read-only volume.</p> <p>Examples:</p> <p>SearchTools.Replace E:/Repository/source/*.Mod AosCommands Commands ~</p> <p>or this real case used when Utilities.Mod was renamed Strings.Mod:</p> <p>SearchTools.Replace *.Mod Utilities. Strings. ~</p>
<b>Stop</b>	To clean up: SystemTools.Free SearchTools ~

### ***Text comparison tool for comparing two texts in parallel – GUI***

<b>Usage</b>	<p>Two texts are presented one at the left, the other at the right of a window with a scrollbar in the middle. Each line of both texts is numbered and where a discrepancy is detected the lines are offset and highlighted in red at the left and in blue on the right. The relative position of the differences is indicated by a red and respectively blue horizontal line at the left and at the right of the scrollbar. The total number of discrepancies is displayed at the bottom.</p> <p>The file names appear in green when no difference is found and red otherwise.</p> <p>The two texts cannot be edited but, after having edited any of them, its file name can be re-entered and the comparison done by hitting „Diff“.</p> <p>This application is a GUI extension of DiffLib.Mod described below.</p>
<b>Start</b>	<p>WMDiff.Open [fileNameL fileNameR] ~</p> <p>If one of the files does not exist, the window remains empty.</p> <p>Several comparisons may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Tools → Diff</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMDiff DiffLib ~</p>
<b>Data files</b>	DiffLib.Mod WMDiff.Mod

### ***Text comparison tool***

<b>Usage</b>	<p>Two texts are compared line by line and the result appears in the Kernel log. Each line of both texts is prefixed with „&lt;“ or „&gt;“ depending if it belongs to the file name at the left or at the right and with (linenumber:position). When no difference is detected nothing appears in the log, except the file names.</p>
<b>Start</b>	DiffLib.Compare fileNameL fileNameR ~
<b>Stop</b>	To clean up: SystemTools.Free DiffLib ~

### ***Decoder of binary executable code - GUI***

<b>Usage</b>	<p>Decode a binary executable code for one of the supported CPUs in the corresponding assembly language.</p>
<b>Start</b>	<p>Decoder.OpenEmpty ~</p> <p>Decoder.Open fileName ( procName   progCounter) ~</p> <p>fileName: name of the program to decode</p> <p>procName: name of the procedure to decode</p> <p>progCounter: integer value for the program counter</p>

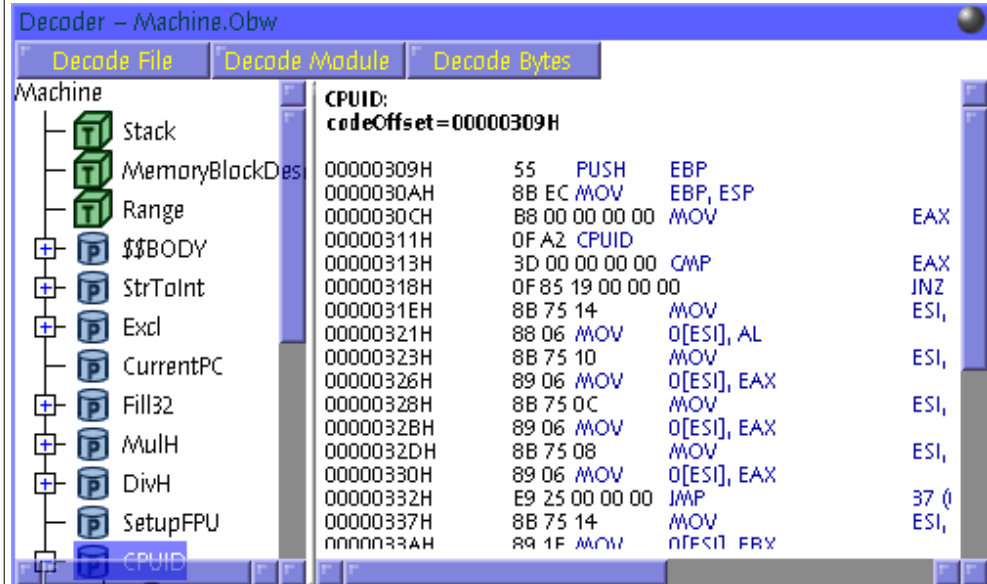
Open a decoder window showing the structure and the assembly language text of a binary executable. The decoder is directed by the module name suffix which can be:

```
.Obx : native i386
```

.Obw : WinAos uses the same decoder as .Obx

.Oba : ARM

.Abx : AMD64



```
[ WMScreenShot.SnapShotRange test.bmp 500 300 0 0 ~ ]
```

Three possibilities are offered (a dialog window helps the user):

Decode File: decode a file specified by the full name

Decode Module: decode a *loaded* module, specified without suffix

**Decode Bytes:** decode a series of bytes in hexadecimal format, separated by spaces.

Several decoders may be running in parallel.

**Stop**

Close the window(s).

To clean up: SystemTools.Free AMD64Decoder ARMDDecoder I386Decoder  
Decoder MemoryReader ~

## Data files

DecoderRes.zip

## Component viewer

<b>Usage</b>	A tool for visualizing a visual component defined by an XML description.  Example: Used by the FractalDemo application.
<b>Start</b>	ComponentViewer.Open fileName.XML ~
<b>Stop</b>	Close the window. To clean up: SystemTools.Free ComponentViewer ~

# Communication

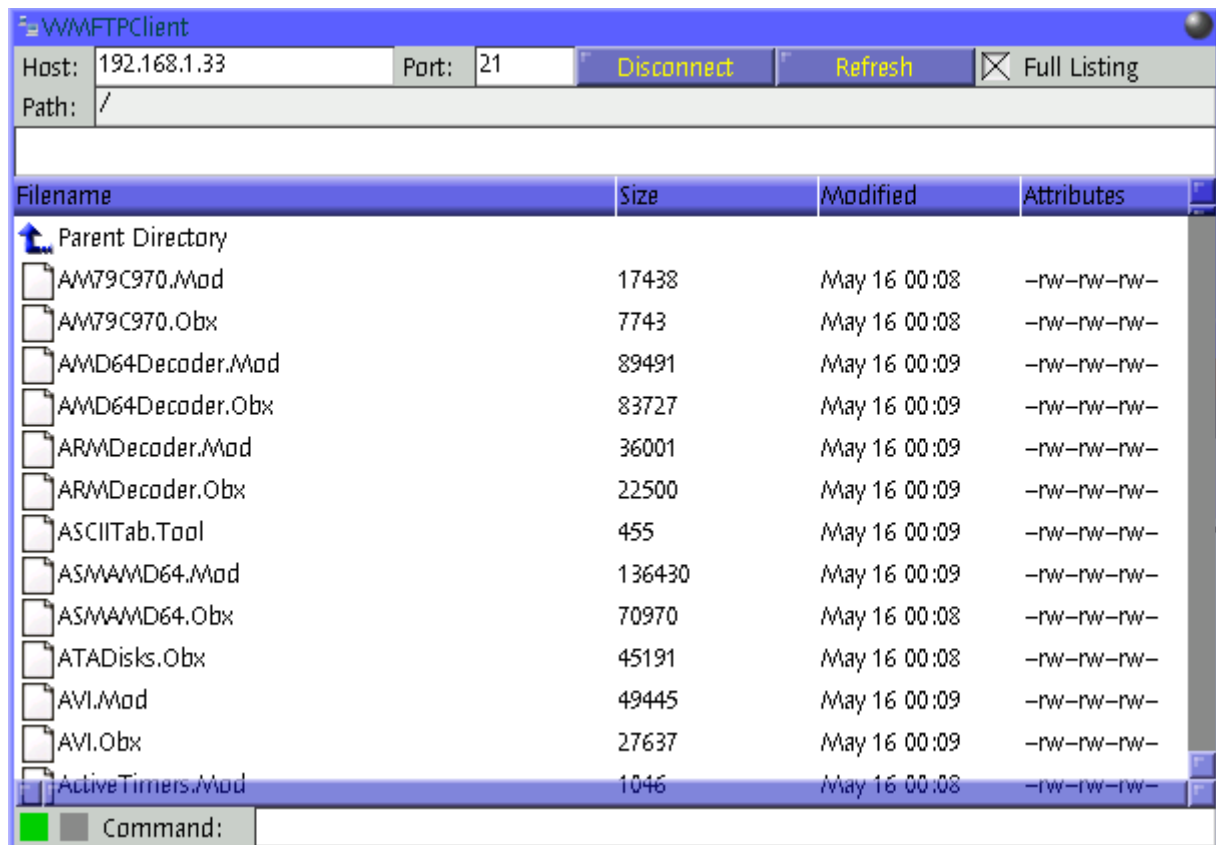
## FTP server

<b>Usage</b>	The FTP server implements most of RFC-765 and supports user accounts with different permissions and virtual root directories. Start the server first, then add and remove user with their authorizations at will. Data transfer activity is automatically logged.
<b>Start</b>	<p>WebFTPServer.Start [„\l:“ logfileName] ~ Start the FTP server. The optional parameter prepares the logging of FTP clients activity. The default is named FTP.log. A confirmation message is sent to the Kernel log. The server is listening on port 21.</p> <p>Thereafter, any number of potential FTP client users may be added by executing:</p> <p>WebFTPServer.AddUser userName password maxLogins permissions [root] ~ userName : the name with which an FTP client user must sign in password : the password to enter by the client maxLogins : maximum number of concurrent logins. A negative value allows an unlimited number of logins. permissions : assigned to an FTP client r : permission to read from server w : permission to write to server p : a password must be used m : must use an e-mail address as password root: the root directory that is accessible to a client</p> <p>Add a user with its specifications. Users data is stored in WebFTPUsers.dat and is persistent from session to session.</p> <p>Here 2 examples: WebFTPServer.AddUser userName password -1 rwp FAT:~ WebFTPServer.AddUser anonymous none 3 rwpm FAT:/ftproot/ ~</p> <p>WebFTPServer.RemoveUser userName ~ Remove the named user.</p> <p>WebFTPServer.ListUsers ~ List all users with their details.</p>
<b>Stop</b>	WebFTPServer.Stop ~
<b>Data files</b>	Log file, WebFTPUsers.dat

### A selection of FTP clients to work with the A2 server

Connect to server → ftp:// ...	Mac OS X	Files can be downloaded from the server but not uploaded.
Cyberduck	Mac OS X	<a href="http://cyberduck.ch">http://cyberduck.ch</a>

## FTP client – GUI



[ WMScreenShot.SnapShotRange test.bmp 606 422 0 0 ~ ]

Usage	
<b>Start</b>	<p>WMFTPCClient.Open ~</p> <p>The field „Host“ contains “bluebottle.ethz.ch”. Replace that with either the domain name or the IP address of the FTP server to access.</p> <p>The field “Port” contains “21” which is the number of the listening port on the server.</p> <p>A two-step dialog asks to enter a userName and a password.</p> <p>The green/red square in the lower left corner of the window indicates the state of the connection. When the connection is well established, the files contained in the root made accessible to the client are listed.</p> <p>Example of connection with the Bluebottle FTP server:</p> <p>Host : bluebottle.ethz.ch</p> <p>Port : 21 (leave the default)</p> <p>Username : ocp (for Oberon Community Platform)</p> <p>Password : download</p> <p>giving access to several A2 build images ready for download, as documented in <a href="http://www.bluebottle.ethz.ch/download.html">http://www.bluebottle.ethz.ch/download.html</a></p> <p>Files can be transferred from one PC to the other by selecting and dragging with ML.</p> <p>Several connections may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Tools → FTP</p>
<b>Stop</b>	<p>Hit the „Disconnect“ button.</p> <p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMFTPCClient FTPClient ~</p>

<b>Data file</b>	Window icon: WMIcons.tar://WMFTPClient.png
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#### A selection of FTP servers to work with the A2 client

Sharing → File sharing	Mac OS X	
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### **FTP**

<b>Usage</b>	Command line controlled FTP.
<b>Start</b>	FTPClient.Open hostName userName password ~ hostName : domain name or IP address of the FTP server userName : name assigned by the FTP server password : password assigned by the FTP server  FTP.Directory ~ FTP.ChangeDir directoryName ~ FTP.MakeDir directoryName ~ FTP.GetFiles {fileName} ~ FTP.PutFiles {fileName} ~ FTP.PutTexts {fileName} ~
<b>Stop</b>	FTP.Close ~ To clean up: SystemTools.Free FTP FTPClient TCP DNS IP Network WSock32 ~

### **TFTP server**

<b>Usage</b>	Command line controlled TFTP server.
<b>Start</b>	TFTP.Start ~
<b>Stop</b>	TFTP.Stop ~ To clean up: SystemTools.Free TFTP IP UDP ~
<b>Build</b>	Native only: A2, A2Mini, AMD64

### **Ping**

<b>Usage</b>	Determine whether it is possible to reach an address. Handles Ipv4 and Ipv6.
<b>Start</b>	Ping.Ping hostName [pingSize] [timeout] ~ hostName : domain name or IP address pingSize : ping packet size in bytes. Default is CONST PingSize = 32. timeout : echo reply time-out in ms. Default is CONST Timeout = 1000. The information appears in the Kernel log.
<b>Stop</b>	To clean up: SystemTools.Free Ping ~
<b>Build</b>	Native only: A2, A2Mini, AMD64

### **Trace route**

<b>Usage</b>	Determine the route taken by packets across an IP network. Handles Ipv4 and Ipv6.
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<b>Start</b>	TraceRoute.TraceRoute hostName [pingSize] [timeout] ~ hostName : domain name or IP address pingSize : ping packet size in bytes. Default is CONST PingSize = 32. timeout : echo reply time-out in ms. Default is CONST Timeout = 1000. The information appears in the Kernel log.
<b>Stop</b>	To clean up: SystemTools.Free TraceRoute ~
<b>Build</b>	Native only: A2, A2Mini, AMD64

## ***TCP port logger***

<b>Usage</b>	Log TCP port activity.
<b>Start</b>	TCPPortLog.Install ~ Trace data is directed to the Kernel log.  TCPPortLog.Remove ~
<b>Stop</b>	To clean up: SystemTools.Free TCPPortLog ~
<b>Build</b>	Native only: A2, A2Mini, AMD64

## ***Quote server***

<b>Usage</b>	Quote of the day server.
<b>Start</b>	QuoteServer.Open [fileName] ~ fileName : name of the text (ASCII) file from where the quotes are extracted. Default is CONST DefaultQuoteFile = "Quotes.txt". The maximum length of a quote is CONST MaxQuoteLen = 511. A quote may contain line breaks. Quotes are separated by at least one comment line, beginning with a hash "#".  QuoteServer.ReadQuotes fileName ~ fileName : name of the text file from where the quotes are extracted.
<b>Stop</b>	To clean up: SystemTools.Free QuoteServer ~
<b>Data files</b>	Quotes.txt

## ***Quote reader***

<b>Usage</b>	Get a quote from an RFC865-compliant quote server.
<b>Start</b>	RFC865Client.GetQuote hostName ~ hostName : domain name or IP address. The quote appears in the Kernel log.
<b>Stop</b>	To clean up: SystemTools.Free RFC865Client ~

## ***Raw printing using port 9100***

<b>Usage</b>	Raw printing to a printer supporting what is commonly referred to as any of the following: port 9100, port printing, standard IP or raw sockets. <a href="http://www.office.xerox.com/support/dctips/dc00cc0104.pdf">www.office.xerox.com/support/dctips/dc00cc0104.pdf</a>
<b>Start</b>	TCPTools.SendFile hostName port fileName ~
<b>Stop</b>	To clean up: SystemTools.Free TCPTools ~

## V24 Tracer

<b>Usage</b>	Man in the middle attack for serial ports, with the purpose of analyzing the data stream flowing in and out of an unknown serial device. Using the tracer entails setting up two computers communicating via serial ports: A PC running A2 installed between a PC driving a serial device and the device itself. The PC running A2 must have at least 2 serial ports.
<b>Start</b>	<p>V24Tracer.Enable 0 1 bps ~    Start the tracer.     bps : transmission speed in bps, e.g. 9600.</p> <p>Proceed as follows:</p> <ol style="list-style-type: none"> <li>1. Connect the device to be traced to port 0.</li> <li>2. Connect the machine that knows the device to port 1.</li> <li>3. Start the tracer, guessing the connection settings (speed, etc.).</li> <li>4. Start using the device from the machine that knows the device.</li> <li>5. Analyze the trace data in the kernel log.</li> <li>6. If the traced data looks strange, disable the tracer, re-guess the connection settings and goto 3.</li> </ol> <p>V24Tracer.Disable ~  V24Tracer.SetMode [mode] ~     mode : the default value is "fine" which means display the origin of each character, its hex value and printable value. Produces a long trace, better avoid it by specifying "coarse" for example.</p>
<b>Stop</b>	To clean up: SystemTools.Free V24Tracer ~

## HTTP server

<b>Usage</b>	
<b>Start</b>	<p>WebHTTPServerTools.Start ["\r:" default root directory] ["\l:" log file] ~</p> <p>WebHTTPServerTools.AddHost hostName ["\r:" root directory] ["\d:" default file] ["\e:" error file] ~</p> <p>WebHTTPServerTools.RemoveHost hostName ~</p> <p>WebHTTPServerTools.ListHosts ~</p>
<b>Stop</b>	<p>WebHTTPServerTools.Stop ~</p> <p>To clean up: SystemTools.Free WebHTTPServerTools WebHTTPServer  TFClasses TCPServices TLS CryptoRSA CryptoSHA1 CryptoMD5 CryptoHMAC  CryptoHashes CryptoUtils CryptoBigNumbers Random CryptoCiphers BIT TCP  WebHTTP TFLog IP Network WSocket ~</p>

## VNC server

<b>Usage</b>	<p>Implements the Remote Frame Buffer protocol version RFB 3.3 of January 1998 which was closed in 2002. <a href="http://en.wikipedia.org/wiki/RFB_protocol">http://en.wikipedia.org/wiki/RFB_protocol</a>  This A2 application does not support file transfer, compression or encryption and not HTTP.</p> <p>Install a Virtual Network Computing server which allows VNC clients to remotely</p>
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	<p>control of the server machine. Server and client use a simple VNC protocol, Remote Frame Buffer (RFB), based on:</p> <ol style="list-style-type: none"> <li>1. a graphic primitive from server to client, put a rectangle of pixel data at the specified X,Y position and</li> <li>2. event messages from client to server.</li> </ol> <p><b>Security</b></p> <p>The server supports a simple challenge-response protocol to verify a password of up to 32 characters (other servers have usually a limit of 8), supplied by the connecting user. The rest of the session is unencrypted and so anything typed into the viewer passes “in the clear” to the server. The server is suitable for use within a local network or secure VPN, but not for general use over untrusted networks, such as the Internet.</p>
<b>Start</b>	<p>WMVNCView.Install name password [ port [ x [ y [ width [ height ] ] ] ] ~</p> <p>name: string, optionally enclosed in " ". This name will be observable by the VNC client.</p> <p>password: string, optionally enclosed in " ". Use "" for no password.</p> <p>port: listening port of the server: 5900, 5901, 5902, ... Here, the default is “5901”.</p> <p>Note: A VNC client may use another default port number, not readily noticed. It is advisable to find out that number in advance, and to use it.</p> <p>Each observable view is associated with a different port.</p> <p>x, y, width, height: define a view port, area of the virtual desktop observable by VNC clients connected to the listening port.</p> <p>The default values are respectively 0, 0, 1024 and 768.</p> <p>Define a view port observable by VNC clients. A view port is given an internal name in the form of “View#i” where 1 &lt;= i is incremented by 1 after each execution of an Install command.</p> <p>Note: View#0 is the name of the first and standard view port and is described in the section “Screen shot”.</p> <p>A list of all existing view ports is obtained by executing SystemTools.ListPlugins ~</p> <p>The VNC server is started as soon as the first Install command is launched.</p> <p>Example:</p> <pre>WMVNCView.Install "Bluebottle VNC ViewA" "guessit" ~ acknowledged in the Kernel log with: VNC server started. Listening on port : 5901 Position (x, y): 0, 0 Size (w, h): 1024, 768</pre> <p>Multiple Install commands may be executed allowing to observe different view ports of different sizes and with different access rights.</p> <p>After having installed a view, a potential VNC client user must be handed over this set of data: server address, port number, and password. The port number may have been chosen in advance to fit the default used by the VNC client.</p> <p>Example in concordance with the view port schema in “Virtual desktop navigation”:</p> <pre>WMVNCView.Install "VNC ViewA" "guessA" 0 0 ~ WMVNCView.Install "VNC ViewB" "guessB" -1024 0 ~ WMVNCView.Install "VNC ViewC" "guessC" 0 -768 ~ WMVNCView.Install "VNC ViewD" "guessD" -1024 -768 ~</pre>
<b>Stop</b>	<p>WMVNCView.Uninstall ~ Stop all listening ports and remove the view ports accessible to VNC clients. Do not execute before all VNC clients have closed their window(s).</p>

	To clean up: SystemTools.Free WMVNCView VNCServer ~
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### A selection of VNC clients to work with the A2 server

Windows	RealVNC VNC Free Edition 4.1	<a href="http://www.realvnc.com/products/free/4.1/index.html">www.realvnc.com/products/free/4.1/index.html</a>
Windows	TightVNC (*)	<a href="http://www.tightvnc.com">www.tightvnc.com</a>
Mac OS X	1) Sharing → Screen sharing 2) Connect to Server vnc://host:port	
Mac OS X	Chicken of the VNC	<a href="http://sourceforge.net/projects/cotvnc">sourceforge.net/projects/cotvnc</a>

(\*) To establish a connection from the client to the server, specify the VNC server to connect to, in one of the following formats:

host  
host:display  
host::port

host can be either an IP address or a domain name.

display is an offset from the TCP port 5900. 0 will be used if not specified.

### VNC client – GUI

<b>Usage</b>	Install a client that watches, controls and interacts with a VNC server. The client observes a view port defined by the server.
<b>Start</b>	<p>VNC.Open serverName [password] port ~  serverName : the server domain name or IP address.  Password : supplied by the VNC server administrator. Use "" when no password is required. A wrong or omitted password is acknowledged with: „Error 1“.  port : number of the listening port on the VNC server. The port number defines which server view is to be accessed.</p> <p>Open a session with the VNC server. Multiple sessions may exist. Windows are explicitly entitled to discriminate them.</p> <p><b>Shortcut:</b> Main menu → Tools → VNC</p> <p>VNC.Show ~ List the existing connections with number, pixel format (16 or 32 bits) and window size in the KernelLog.  Example:  VNC connections  0 32-bit  1 32-bit 1280x1024</p> <p>VNC.Paste connection textString ~ Use for ?</p>
<b>Stop</b>	<p>Close the window(s).  To clean up: SystemTools.Free VNC ~</p>

### A selection of VNC servers to work with the A2 client

Windows	RealVNC VNC Free Edition 4.1	<a href="http://www.realvnc.com/products/free/4.1/index.html">www.realvnc.com/products/free/4.1/index.html</a> In the Options (Properties : Legacy), Import VNC 3.3 Settings and make sure to set Authentication with a password. When a client is connected, an icon is shown in inverted color.
Windows	TightVNC	<a href="http://www.tightvnc.com">www.tightvnc.com</a> When a client is connected, an icon is shown in inverted color.

Mac OS X	Sharing → Screen sharing	Client does not work with secure OS X.
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## ***Samba server***

<b>Usage</b>	Provide file services in cooperation with Samba clients of various makes. Folders and files of a computer may be accessed by others users on a network.
<b>Start</b>	<p>SambaServer.StartServer ~ Start the server.</p> <p>SambaServer.AddShare folderName sharePath ~  folderName: the name by which a client can access a folder on the server.  sharePath: the access path on the server.  Example: SambaServer.AddShare client AOS:</p> <p>SambaServer.ListShares ~ List the names of all shared folders, acknowledged with (for example):  SambaServer share list:  folderName AOS:</p>
<b>Stop</b>	<p>SambaServer.StopServer ~</p> <p>SystemTools.Free SambaServer ~</p>

### **A selection of Samba clients to work with the A2 server**

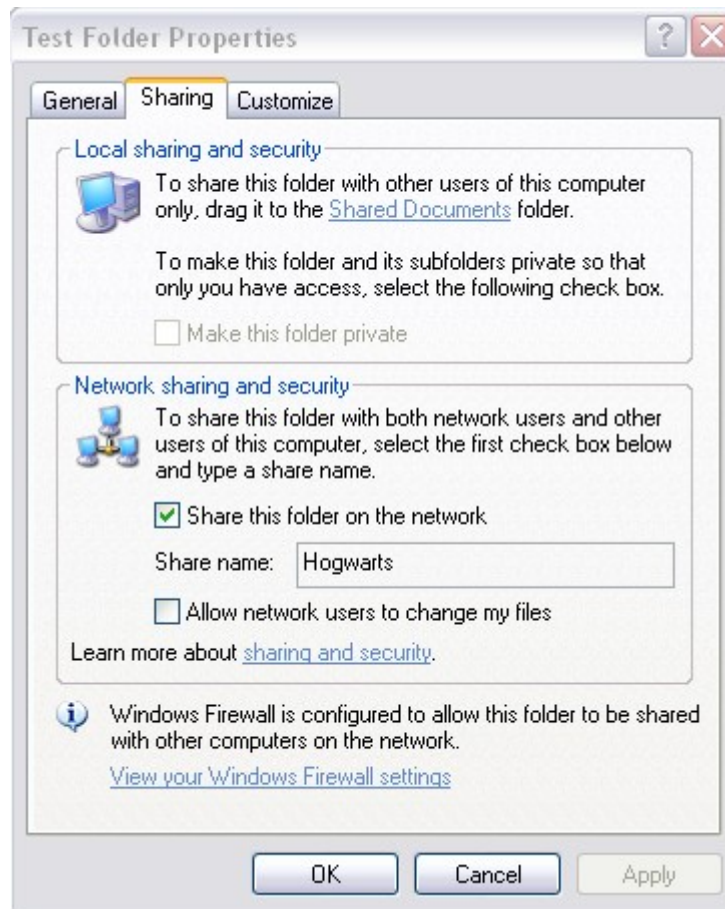
A2	Not tested
Windows XP	<p>Requires to activate the XP policy “Microsoft Network Client: Send Unencrypted Password To Connect To Third-Party SMB Servers”.</p> <p><a href="http://technet.microsoft.com/en-us/library/cc782276(WS.10).aspx">http://technet.microsoft.com/en-us/library/cc782276(WS.10).aspx</a></p> <p>Connect to A2 server with user “guest”, no password (successful).</p>
Mac OS X	Test fails: signals that user name and password are invalid (using “guest guest”)

## ***Samba client***

<b>Usage</b>	Provide file services in cooperation with Samba servers of various makes.
<b>Start</b>	<p>FSTools.Mount prefix “SmbFS” ipAddress folderName [ user [ password ] ] ~  Mount the shared file system made available by the Samba server.  prefix : the name of the volume mounted by the client.  IpAddress : the IP address or the domain of the server.  FolderName : the name assigned on the server.  User : use “guest”  password : use :guest”</p> <p>FSTools.Unmount prefix [f] ~ Unmount the specified volume. Use \f to force unmounting.</p>
<b>Stop</b>	SystemTools.Free SambaClient ~

### **A selection of Samba servers to work with the A2 client**

A2	Not tested
Windows XP	<p>On Windows, operate as Administrator to grant access to the target folders. These folders must be given the property “Network sharing and security” → Share this folder on the network – see picture below.</p>
Mac OS X	Test fails: “CONNECTION ERROR!”



## Synergy client

Synergy – <http://synergy2.sourceforge.net> - lets you share a single mouse and keyboard between multiple computers with different operating systems, each with its own display, without special hardware. It's intended for users with multiple computers on their desk since each system uses its own monitor(s). Redirecting the mouse and keyboard is as simple as moving the mouse off the edge of the screen.

Synergy consists of a server, which provides a keyboard and a mouse so to speak, and a client per "second" machine which can then be operated without input devices. The server and the clients may run different OSes (Windows, Mac OS X and Unix) in any combination. A2 offers only a Synergy client. The computers must be connected to via TCP/IP.

After having installed the Synergy server, it must be configured and started. The server and each client should be given a (screen) name for identification during the configuration. The name is irrelevant and an alias such as the machine's IP address is good enough.

<b>Usage</b>	<p>Pick which keyboard and mouse will be shared. The computer with that keyboard and mouse is called the „primary screen“ and will run the Synergy server. All of the other computers are „secondary screens“ and run a Synergy client.</p> <p>Synergy is a KM solution for sharing equipment, not KVM (keyboard, video, mouse): each machine must have a display attached. A display with dual-input</p>
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	<p>cannot be used to control two machines. For this A2 Synergy client, it is not the case that Synergy merges the clipboards of all the machines into one, allowing cut-and-paste between them, as do commercial products.</p> <p><b>Security</b> Synergy provides no built-in encryption or authentication. Given that, Synergy should not be used on or over any untrusted network, especially the Internet. It's generally fine for home networks. SSH (secure shell) is not available in A2 for strong encryption and authentication.</p>
<b>Start</b>	<p>SynergyClient.Connect serverName screenName ~  serverName : an IP address or the machine name (Windows or iMac)  screenName : name of the client screen assigned in the Synergy server configuration.</p> <p>In case the Synergy server is stopped, the client is also stopped but the connection is not closed. It is required to close the client before resuming operation.</p>
<b>Stop</b>	<p>SynergyClient.Close  To clean up: SystemTools.Free SynergyClient ~</p>

## ***BlueTerminal for V24 communication - GUI***

Warning: it will not last long until this technology completely disappears from modern machines. An alternative solution, say via USB port, is needed

<b>Usage</b>	Have machines A and B, each equipped with a serial port, connected via a "null modem" cable: machine A runs this A2 application, machine B will be running the same or an equivalent terminal application, such as Windows' Hyperterminal.
<b>Start</b>	<p>On machine A, install the serial port driver first by executing V24.Install ~  Verify how many ports are installed and ready by executing Serials.Show ~  Pick the port number of an available COM port, which will be used.</p> <p>Start the terminal application on machine B and on machine A execute:  WMV24Component.Open ~  The two machines are now in communication.</p> <p><b>Important application:</b>  Low-level tracing of the kernel activity of a starting A2 which then fails (the machine reboots for example). That machine can be configured to behave as a terminal application as is described in the "Enable Low-Level Tracing" section of <a href="http://www.ocp.inf.ethz.ch/wiki/Documentation/Installation#toc13">http://www.ocp.inf.ethz.ch/wiki/Documentation/Installation#toc13</a> . The trace will show up on machine B and analyzing the trace might hint at the problem.</p> <p>Several BlueTerminals may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Tools → Terminal</p>
<b>Stop</b>	<p>Close the window(s).  To clean up: SystemTools.Free WMV24Component ~</p>
<b>Restorable</b>	Yes
<b>Data file</b>	Window icon: WMIcons.tar://WMV24Component.png

## Serial shell

<b>Usage</b>	Have machines A and B, each equipped with a serial port, connected via a “null modem” cable: machine A runs this A2 application, machine B will be running the BlueTerminal application or an equivalent terminal application, such as Windows' Hyperterminal. Once both applications are running, machine B can take control of the A2 operating system.
<b>Start</b>	<p>On machine A, install the serial port driver first by executing V24.Install ~ Verify how many ports are installed and ready by executing Serials.Show ~ Pick the port number of an available COM port, which will be used.</p> <p>Start the terminal application on machine B and on machine A execute: ShellSerial.Open [portNbr bps parity stopBits] ~     portNbr : COM port number. Default is DefaultPort = 1     bps : transmission speed. Default is DefaultBPS = 115200     parity : odd, even, mark, space, no. Default is DefaultParity = no     stopBits : stop bit length 1, 1.5, 2. Default is DefaultStop = 1 Starts the listening application on the specified COM port.</p> <p>The terminal application is then prompted as is described in the “Shell” section, which describes how a user can take control of the remote A2 operating system.</p>
<b>Stop</b>	To clean up: SystemTools.Free ShellSerial Shell~
<b>Data files</b>	Shell.Alias

## Telnet shell

<b>Usage</b>	Have machines A and B connected via TCP/IP: machine A runs this A2 application, machine B will be running a Windows hyper-terminal application or an equivalentWMVTWMVT terminal application. Once both applications are running, machine B can take control of the A2 operating system using a set of predefined shell commands.
<b>Start</b>	<p>Telnet.OpenService ~     Start a telnet server listening on port 23. Pick the domain name or the IP address of the host machine running A2.</p> <p><u>Windows XP</u>: Define a Hyperterminal connection via TCP/IP to the host and open the connection.</p> <p><u>Windows Vista</u>: Activate the accessory Telnet and in the search field enter “telnet hostName 23”</p> <p><u>OS X</u>: Start the Terminal application, then execute “telnet hostName 23” to open the connection. To exit the connection, hold CTRL, press “]” and then enter “quit”.</p> <p>When the connection is established, “&gt;” prompt appears in the window. From now on the host can be controlled with a set of shell commands. The shell commands are defined in ShellCommands.Mod and not in Shell.Mod as is the case for other shells.</p>
<b>Stop</b>	To clean up: SystemTools.Free Telnet ShellCommands ~

## VT100 terminal emulator - GUI

<b>Usage</b>	This application is not working. VT100 terminal emulation supporting color and cursor control through a system of
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	ESC sequences.
<b>Start</b>	WMVT100.Open hostName [port] ~ hostName : IP address port : The default port number is 23.
<b>Stop</b>	Close the window. To clean up: SystemTools.Free WMVT100 ~

## ***IMAP/SMTP mail client - GUI***

<b>Usage</b>	Handle mail.
<b>Start</b>	IMAPGUI.Open ~  <b>Shortcut:</b> Main menu → Apps → MailClient  Several mail clients may be running in parallel.
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free IMAPGUI ~
<b>Restorable</b>	Yes
<b>Data files</b>	IMAPUtilities.Mod, IMAP.Mod, IMAPClient.Mod, RMSMTP.Mod, IMAPGUI.Mod / IMAPIcons.tar Window icon: WMIcons.tar://IMAPGUI.png

## **Multimedia**

### ***Sound cards/chips for which a driver exists***

<b>Vendor / ID</b>	<b>Chip</b>	<b>DeviceID</b>	<b>Driver</b>	<b>Install command (*)</b>
Intel / 8086	i810 chipset (has integrated AC'97 controller)		i810Sound.Mod	i810.Install ~
Ensoniq / 1274	ES1371 ES1373 5880 Audio PCI ES1371 on Creative SoundBlaster PCI 128	1371 1373 5880 ???	EnsoniqSound.Mod	Ensoniq.Install ~
Yamaha / 1073	YMF724 YMF724F YMF740 YMF740C YMF744 YMF754	0004 000D 000A 000C 0010 0012	YMF754.Mod YMF754Util.Mod YMF754.Bin	YMF754.Install ~

(\*) These commands can be launched automatically either:  
by placing them in the Autostart section of Configuration.XML or  
by inserting "Boot=PCITools.DetectHardware" in the Configuration strings

Yamaha: The driver requires the microcode YMF754.Bin for the controller and the DSP.  
The microcode can be retrieved from the Alsa server at:

<ftp://ftp.alsa-project.org/pub/manuals/yamaha/pci/724hwmcode.c>

and converted to YMF754.Bin by YMF754Util.Mod

## ***Sound mixer***

<b>Usage</b>	A sound device driver must be installed already.
<b>Start</b>	WMMixer.Open ~ Several sound mixers may be running in parallel.
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free WMMixer ~

## ***Ogg Vorbis player***

made of: WMOGGPlayer.Mod, OGGUtilities.Mod and OGGRadios.Text. The latter lists

- URLs (pre-requisite: communication driver installed)
- or local file names having .ogg as extension

Sound stream Ogg Vorbis Codec: <http://www.vorbis.org> and <http://vorbis.audiohq.de>  
The stream server accessed are mostly based on icecast - <http://www.icecast.org>

## ***Television viewer – GUI***

<b>Usage</b>	A television viewer for a specific Hauppauge card with a BT848 chip or equivalent. This chip is antiquated and difficult to acquire. A Hauppauge TV driver must be installed first.
<b>Start</b>	TV.Open [ [ cardNumber] TXT] ~ The optional parameters are: cardNumber: to use when more than one card is installed TXT: provided a teletext decoder is built-in, start teletext capturing at open time. After that, the TV channel is switched every 5 minutes. This can be used for automatic Teletext caching, e.g. on a web server.  TV.BuildChannelTable ~ start a full scan and build the channel table TVChannels.XML automatically.
<b>Stop</b>	The window cannot be closed. To clean up: SystemTools.Free TV TVChannels ~
<b>Restorable</b>	Yes
<b>Build</b>	Native only: A2, A2Mini, AMD64
<b>Data files</b>	TVChannels.XML

## ***Teletext viewer – GUI***

<b>Usage</b>	A teletext viewer for a specific Hauppauge card with a teletext decoder. A TV device driver must be installed already.
<b>Start</b>	TeletextViewer.Open ~
<b>Stop</b>	The window cannot be closed. To clean up: SystemTools.Free TeletextViewer TeletextBrowser TeletextFont ~
<b>Restorable</b>	Yes

<b>Build</b>	Native only: A2, A2Mini, AMD64
<b>Data files</b>	teletext.bfnt, next.png, prev.png, refresh.png

## ***HTTP server for teletext access through a Web browser***

<b>Usage</b>	<p>To enable Server Side Includes and servicing dynamic the captured teletext pages as web pages, insert two new sections in Configuration.XML:</p> <pre>&lt;Section name="DynamicWebpages"&gt;   &lt;Section name="ActiveElementModules"&gt;     &lt;Setting value="WebStd"/&gt;     &lt;Setting value="WebTeletextViewer"/&gt;   &lt;/Section&gt; &lt;/Section&gt; &lt;Section name="PrevalenceSystem"&gt;   &lt;Section name="PersistentObjectModules"&gt;     &lt;Setting value="WebStd"/&gt;   &lt;/Section&gt; &lt;/Section&gt;</pre> <p>To view the teletext pages with a Web browser, enter the host name or its IP address followed by /teletext.dxp Example: http://192.168.1.33/teletext.dxp</p>
<b>Start</b>	WebHTTPServerTools.Start \r:AOS \l:AOS:/HTTP.Log ~ followed by: DynamicWebpagePlugin.Install ~
<b>Stop</b>	DynamicWebpagePlugin.Uninstall ~ followed by: WebHTTPServerTools.Stop ~
<b>Build</b>	Native only: A2, A2Mini, AMD64.
<b>Data files</b>	SystemTools.Free DynamicWebpagePlugin WebHTTPServerTools WebHTTPServer ~

## **System inspection and performance measurement**

### ***CPU inspector***

<b>Usage</b>	Inspect the processor signature and provide information about the features supported and implemented, optionally with more details, routing the information to the Kernel Log. Applies to Intel CPU >= i486 and to AMD processors, provided the low-level CPUID instruction is supported.
<b>Start</b>	<p>CPUID.Show [options] ~</p> <p>options</p> <p>“-d”, “--details” : supply more details</p> <p>Sample output without details:</p> <p>Prozessor: Intel(R) Pentium(R) 4 CPU 3.00GHz Vendor: GenuineIntel, Family: 0FH, Model: 04H, Stepping: 03H Logical processor count: 2 Features: MMX: Yes, SSE: Yes, SSE2: Yes, SSE3: Yes, Supplemental SSE3: No Extended 3DNow!: No, 3DNow!: No, AMD MMX Extensions: No 64bit instructions: Yes</p>
<b>Stop</b>	To clean up: SystemTools.Free CPUID ~

## ***Memory inspector***

<b>Usage</b>	Inspect the memory mapping, routing the information to the Kernel Log. Applies to Intel CPU >= i486 and to AMD processors.
<b>Start</b>	MemInfo.DisplayMap ~     Display the memory mapping for each processor.  MemInfo.DisplayMTTR ~
<b>Stop</b>	To clean up: SystemTools.Free MemInfo ~
<b>Build</b>	Native only: A2, A2Mini, AMD64.

## ***TCP tracker - GUI***

<b>Usage</b>	A table listing of the recognized connections appears on the desktop. A number of informations is given for each connection: Remote address, Local Port, State (Opened, Closed, ...), etc After having selected one of those connections, it can be either closed or discarded.
<b>Start</b>	WMTCPTracker.Open ~  <b>Shortcut:</b> Main menu → Inspect → TCPTraffic
<b>Stop</b>	Close the window. WMTCPTracker.Close ~ To clean up: SystemTools.Free WMTCPTracker ~
<b>Restorable</b>	Yes
<b>Data file</b>	Window icon: WMIcons.tar://WMTCPTracker.png

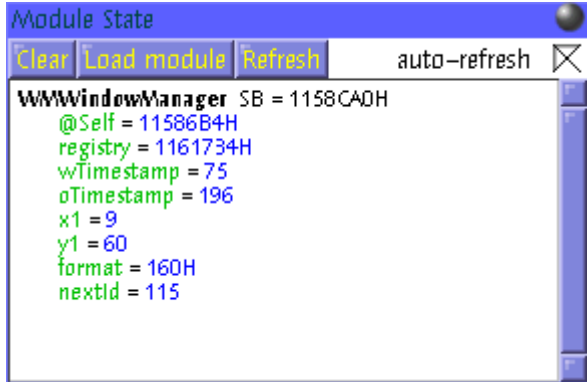
## Object tracker – GUI

Object Tracker									
PID	CPU #	CPU %	Prio	Mode	PC	Active Object	Module		
4088	0	0	2	awc	0	WWWMessages.MsgSequencer	WWWMessages	MsgSeq	
4084	0	0	2	awc	1739	WWWMessages.MsgSequencer	WWWMessages	MsgSeq	
3796	0	0	2	awc	1739	WWWMessages.MsgSequencer	WWWMessages	MsgSeq	
3724	0	4	2	awc	1739	WindowManager.WindowManager	WindowManager	DirtyQ	
3664	0	0	2	awc	0089	KernelLogger.Logger	Kernel	Timer.S	
3660	0	0	2	run	311	Display.WinMain	Unknown	Unknow	
3536	0	0	2	awc	70612	WWWMessages.MsgSequencer	Unknown	Unknow	
3164	0	0	3	run	70612	WMOBJECTTracker.Window	Kernel	Timer.S	
3048	0	0	2	awc	311	WWWMessages.MsgSequencer	Unknown	Unknow	
3008	0	0	2	awc	70612	WWWMessages.MsgSequencer	Unknown	Unknow	
2800	0	0	4	run	70612	Objects.Clock	Unknown	Unknow	
2732	0	0	2	run	70612	WWWMessages.MsgSequencer	WWWMessages	MsgSeq	
2620	0	0	2	awc	1739	WWWMessages.MsgSequencer	WWWMessages	MsgSeq	
2236	0	0	2	awc	1739	Traps.TrapWriter	Kernel	Timer.S	
2000	0	0	2	awc	311	WWWMessages.MsgSequencer	Unknown	Unknow	
1904	0	0	2	awc	70612	WWWMessages.MsgSequencer	Unknown	Unknow	
1820	0	0	2	awc	70612	WWWMessages.MsgSequencer	Unknown	Unknow	
1688	0	0	2	awc	70612	WindowManager.Fifi	Unknown	Unknow	
612	0	0	2	awc	70612	WWWMessages.MsgSequencer	Unknown	Unknow	
544	0	0	4	awc	70612	Kernel.FinalizerCaller	Kernel	Finalize	
432	0	0	2	awc	1395	WindowManager.Toucher	Unknown	Unknow	
Halt process Halt process unbreakable SortBy:PID Show Stack 21 active objects Refresh									

[ WMScreenShot.SnapShotRange text.bmp 600 500 0 0 ~ ]

<b>Usage</b>	A table listing of the active objects on the stack appears on the desktop.
<b>Start</b>	<p>WMOBJECTTracker.Open [interval] [interleave] ~  interval = interval between updates in ms  interleave = number of updates until refresh  When interval &lt; 1 then the default is = 100  When interleave &lt; 1 the the default is = 10</p> <p>A ML click on an object selects it. To select several contiguous objects, press ML on the first object, then drag on ML downwards or upwards and release ML on the last one. A ML click on the header line de-selects all.</p> <p><b>Shortcut:</b> Main menu → Inspect → Objects</p>
<b>Stop</b>	<p>Close the window.  WMOBJECTTracker.Close ~  To clean up: SystemTools.Free WMOBJECTTracker ~</p>
<b>Restorable</b>	Yes. When restored, the default interval and interleave values are used.

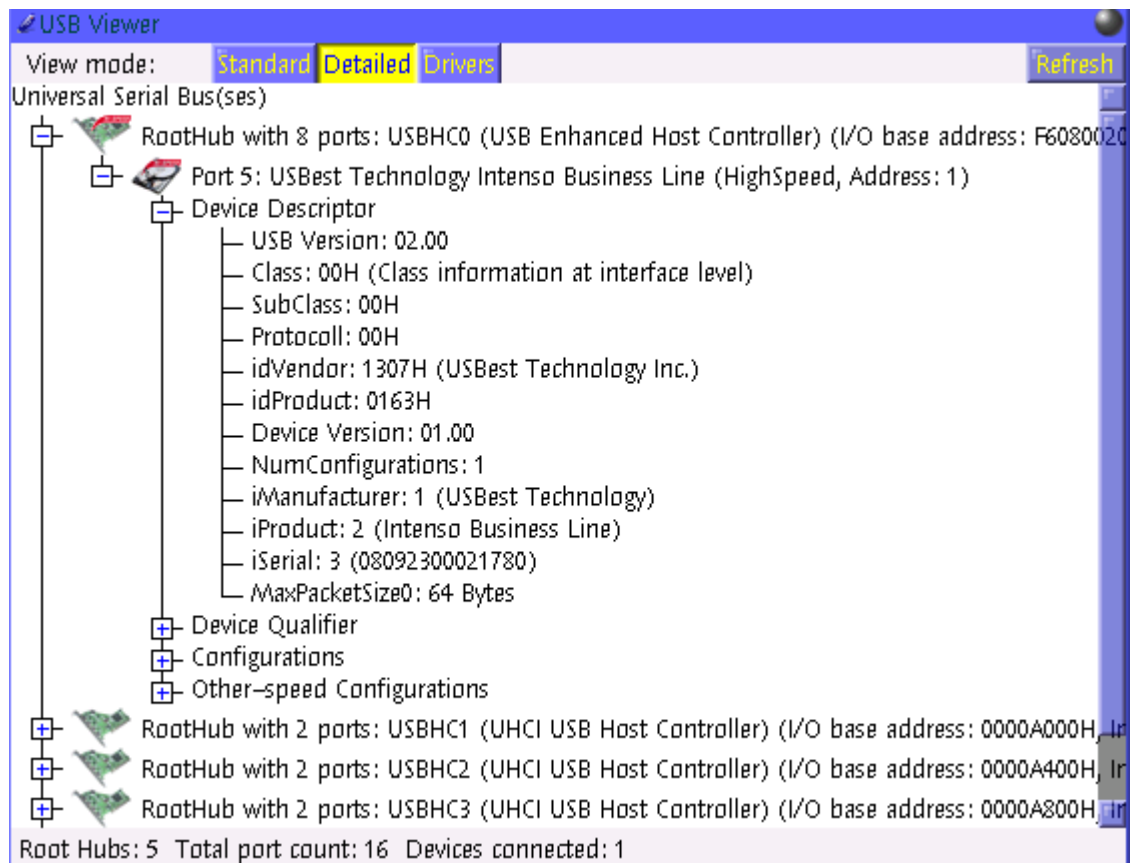
## Module state inspector – GUI

<b>Usage</b>	Inspect the state of a module, that is the current value of the global variables.
<b>Start</b>	<p>WMModuleState.Open [moduleName [interval]] ~ The state of the named module is displayed if it is loaded, else signals “moduleName not loaded”. When moduleName is omitted, a dialog box asks to enter a name. interval = interval between refreshes in ms. Default is 2000.</p>  <p>Four controls are provided:  Clear: the window  Load module: a dialog box asks for a name (auto-refresh must be off)  Refresh: refresh immediately, irrespective of interval  auto-refresh checkbox: toggle automatic refresh</p>
<b>Stop</b>	<p>Close the window.  To clean up: SystemTools.Free WMModuleState ~</p>

## PCITools

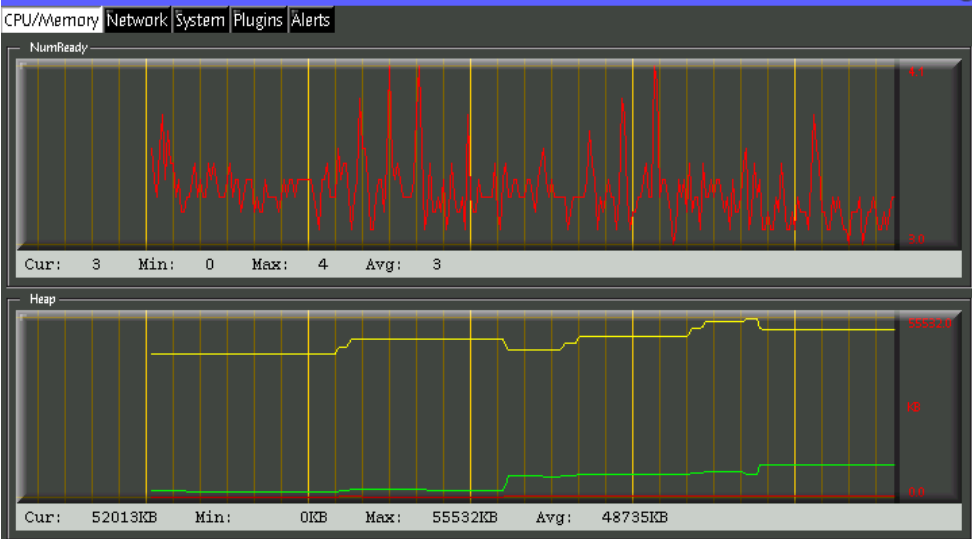
<b>Usage</b>	Provide PCI-related services: explore hardware and install drivers. Uses pci.ids, a file containing PCI vendor ID to vendor string mapping, and DriverDatabase.XML a file listing the currently supported devices for which a driver exists.
<b>Start</b>	<p>PCITools.Scan [options] ~  options  “-d”, “--details” : supply details of PCI configuration space registers  Perform a bus enumeration and display information about found PCI buses and devices.</p> <p>PCITools.DetectHardware ~  Perform a bus enumeration and install the appropriate device drivers when declared available in the DriverDatabase.XML file.</p> <p>It is very convenient to include PCITools.DetectHardware either:  in the Configuration data,  or in the Configuration.XML file.  In that way, all the drivers that might be needed are activated from the start. Very useful when multimedia is going to be used.</p>
<b>Stop</b>	To clean up: SystemTools.Free PCITools DriverDatabase ~
<b>Build</b>	Native only: A2, A2Mini, AMD64
<b>Data files</b>	pci.ids, DriverDatabase.XML

## USB hardware inspector – GUI



<b>Usage</b>	<p>A tree listing the detected USB devices appears in a desktop window. Three different data views are available:</p> <ul style="list-style-type: none"> <li>* Standard</li> <li>* Detailed</li> <li>* Drivers : lists the USB devices registered and shows which devices are bound to drivers.</li> </ul> <p>When external USB devices are inserted or removed, the views can be refreshed to reflect the new situation.</p> <p>Uses the data file WMUsblInfo.tar containing a number of mini-icons and a list of USB devices vendor Ids (that data is available at <a href="http://www.usb.org">www.usb.org</a> ).</p>
<b>Start</b>	<p>WMUsblInfo.Open ~</p> <p>Several inspectors may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Inspect → USBViewer</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMUsblInfo ~</p>
<b>Restorable</b>	Yes
<b>Build</b>	Native only: A2, A2Mini, AMD64
<b>Data files</b>	<p>WMUsblInfo.tar</p> <p>Window icon: WMIcons.tar://WMUsblInfo.png</p>

## System performance monitor – GUI

<b>Usage</b>	
<b>Start</b>	<p>WMPerfMon.Open ~</p>  <p>[ WMScreenShot.SnapShotRange test.bmp 720 400 0 0 ~ ]</p> <p><b>Shortcut:</b> Main menu → Inspect → Performance</p> <p>Several inspectors may be running in parallel.</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free WMPerfMon WMPerfMonTabSystem WMPerfMonTabAlerts WMPerfMonAlerts WMPerfMonComponents WMPerfMonPluginDisks Disks WMPerfMonPluginNetwork Network WSock32 WMPerfMonPluginEvents WMPerfMonPluginMessages</p>

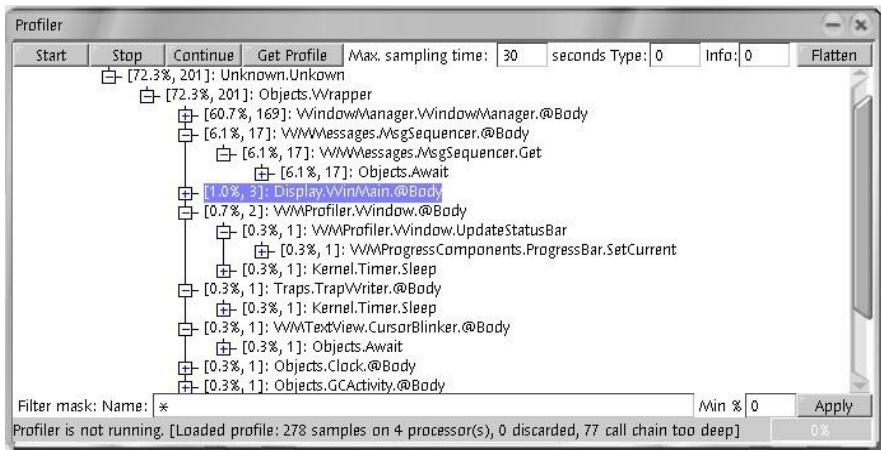


	WMPerfMonPluginPerfMon WMPerfMonPluginMemory WMPerfMonPluginCpu WMPerfMonPlugins WMDiagramComponents ~
<b>Restorable</b>	Yes
<b>Data files</b>	Window icon: WMIcons.tar://WMPerfMon.png

## Event log – GUI


<b>Usage</b>	
<b>Start</b>	WMEventLog.Open ~  WMEventLog.OpenFile [fileName] ~  <b>Shortcut:</b> Main menu → Inspect → Events  Several logs may be running in parallel.
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free WMEventLog EventsMemoryLog EventsUtils Events ~
<b>Restorable</b>	Yes
<b>Data file</b>	Window icon: WMIcons.tar://WMEventLog.png

## Hierarchical Profiler - GUI

<b>Usage</b>	<p>This statistical profiler samples the current program counter (PC) of each CPU once per millisecond. The PC samples are stored in a pre-allocated memory buffer. Based on the samples, the profiler can generate a profile that shows what procedures were encountered how often, approximating where the CPU's have spent how much time.</p> <p>This tool is useful for optimizing the performance of programs in means of identifying hot spots worth being optimized.</p> <p>Note that gathering samples and displaying profiles are two separate processes. The operations Start, Stop and Continue control the process of gathering samples into the memory buffer, where profiles can be extracted from later.</p>
<b>Start</b>	<p>WMProfiler.Open ~ opens the graphical front-end for the hierarchical profiler.</p>  <p><b>Sampling</b></p> <p>The gathering of samples is controlled using the <i>Start</i>, <i>Stop</i> and <i>Continue</i> buttons. The Start operation takes <i>Max. sampling time</i> as parameter. If the profiler is not</p>

	<p>running, it allocates a memory buffer that is large enough to hold samples for the specified time in seconds. This is the maximum duration the profiler can run. Note: The sample buffer is only cleared when the profiler is started but was not running before.</p> <p><b>Generating Profiles</b> The <i>Get Profile</i> button will generate a profile based on the samples currently stored in the buffer, taking <i>Type</i> and <i>Info</i> as parameters.</p> <p>Parameters:</p> <ul style="list-style-type: none"> <li>Type: "0": Hierarchical Profile, "1": Flat Profile</li> <li>Info: "0": don't group, "1": group by thread, "2": group by processor, "3": group by thread and then by processor, "4": group by processor and then by thread</li> </ul> <p><b>Working with Profiles</b> The <i>Flatten</i> button will merge all sub-nodes of the currently selected node into a flat profile. The <i>Apply</i> button will apply the current filter mask whereas the <i>Filter mask</i> has two parameters:</p> <ul style="list-style-type: none"> <li>Name: Only show nodes whose name (Module.Procedure) matches this string. The wildcards "*" and "?" can be used</li> <li>Min %: Only show nodes whose percentage value is equal or greater than this value</li> </ul> <p><b>Without GUI</b> The hierarchical profiler can be controlled without GUI. Note, however, that there is only one sample buffer, so a mixed usage (GUI/non-GUI) is possible.</p> <p>HierarchicalProfiler.Start ~ Start the profiler if not already started. This will clear the current sample data (if any)</p> <p>HierarchicalProfiler.Stop ~ Stop gathering samples</p> <p>HierarchicalProfiler.Continue ~ Continue gathering samples without deleting already gathered samples</p> <p>HierarchicalProfiler.Show ~ Display the profile for the sample data that is currently in the sample buffer</p>
<b>Stop</b>	<p>Close the window To clean up: SystemTools.Free WMPProfiler HierarchicalProfiler HierarchicalProfiler0 ~</p>
<b>Restorable</b>	Yes

## Keyboard key code inspector - GUI

<b>Usage</b>	The key code corresponding to a key stroke (key pressed or key released) is displayed. Key combinations with Ctrl, Alt or Meta-key can also be inspected.
<b>Start</b>	<p>WMKeyCode.Open ~ The Key Code Display panel opens and pressing and holding the "m" key shows this:</p>  <p>[ WMScreenShot.SnapShotRange test.bmp 303 52 0 0 ~ ]</p>

	WMKeyCode.StartLog ~ Direct the information to the KernelLog to retain the evanescent display information. Pressing “m” writes this to the KernelLog: Key: UCS=0000006D, KeySym=0000006D (No Keysym), Key: 'm', Flags= Key: UCS=00000000, KeySym=00FFFFFF (No Key), Key: ", Flags=[RELEASE]  WMKeyCode.StopLog ~ Stop sending information to the KernelLog.
<b>Stop</b>	Close the window. To clean up: SystemTools.Free WMKeyCode ~
<b>Restorable</b>	Yes

## Test and benchmark programs

Programs aiming at helping developers. Some of these are questionable and might be dropped in future.

### *Drag and drop test program - GUI*

<b>Usage</b>	Of questionable value. Have the Kernel Log open to follow the happening.
<b>Start</b>	TestComponenDragDrop.Open ~ Position the cursor in the blue or green area, press ML, drag the cursor within the container panel and observe the information appearing in the log. A MM or ML click opens a dialog, then close it.
<b>Stop</b>	To clean up: SystemTools.Free TestComponenDragDrop ~

### *Visual components test bed - GUI*

<b>Usage</b>	A test bed for some of the visual components, similar to the “Component viewer” described above, but less general since the components used are hard-coded.
<b>Start</b>	TestComponents.TestStandardComponents ~ Presents a window containing a Panel with a Label, and a tool bar (in fact another Panel) with two captioned Buttons. When clicked, the Buttons send a short message to the KernelLog.  TestComponents.TestStringGrids ~ Presents a window containing a Panel with a Label, and a tool bar (in fact another Panel) with a captioned Button. When the Button is clicked, a 4 by 10 grid appears, the top 20 cells being numbered from 0 to 19.  TestComponents.Test name ~ Presents a window containing a visual component. “name” must refer to a valid visual component.  Several component testers may be running in parallel.
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free TestComponents ~

## Example programs

These examples demonstrate how simple it is to start programming in *Active Oberon* using the already available infrastructure.

### ***Text writer - GUI***

<b>Usage</b>	An example text editor, though not full-fledged since the text cannot be saved as a document. Uses WMEditors.
<b>Start</b>	ExampleTextWriter.Open ~
<b>Stop</b>	Close the window. To clean up: SystemTools.Free ExampleTextWriter ~

### ***Drawing pad - GUI***

<b>Usage</b>	An example drawing pad using the mouse as a pen. Uses WMGraphics and WMDialogs
<b>Start</b>	WMScribble.Open ~ Press and hold down ML, then move the mouse to draw a blue scribble until ML is released. Repeat indefinitely. To erase everything, press MR. Press "s" to store the scribble. A dialog window then appears, asking for a file name. The default "scribble.bmp" is offered. Use PicView.Open fileName ~ to visualize.
<b>Stop</b>	Close the window. To clean up: SystemTools.Free WMScribble ~
<b>Data file</b>	Window icon: WMIcons.tar://WMScribble.png

### ***Graphic animation - GUI***

<b>Usage</b>	An example graphical application using a picture of the ETHZ. Uses WMGraphics.
<b>Start</b>	WMGraphicsDemo.Open ~
<b>Stop</b>	Close the window. To clean up: SystemTools.Free WMGraphicsDemo ~
<b>Data file</b>	BluebottlePic0.png

An example program for testing WMtree components as are used in PET, made of: TestTrees.Mod

### ***Pie menu test - GUI***

<b>Usage</b>	Only the central dark green panel reacts to pressing MR: a pie selector appears. Uses WMPieMenu.
<b>Start</b>	PieTest.Open ~ Several tests may be running in parallel.
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free PieTest ~

An example program for testing WM menu components made of: TestMenu.Mod, WMMenus.Mod using Menu.XML

### ***Menu editor - GUI***

<b>Usage</b>	An editor of a fantasy menu of the kind of XmasMenu.XML used in PresentViewer.
<b>Start</b>	MenuEdit.Open ~ The tool bar at the top of the window allows the following:

	<ul style="list-style-type: none"> <li>- Add : a present to the menu in construction. The present can be: dragged in the drawing area or selected with a MM click</li> <li>- Delete: delete the selected present</li> <li>- To Front: move the selected present to the front</li> <li>- Edit: add a caption to the selected present</li> <li>- GetXML: display the XML text elaborated to this point</li> </ul> <p>There remains to copy/paste the final XML text to an editor and to store the document in a file. This file can be exploited by the PresentViewer.</p> <p>Several menu editors may be running in parallel.</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free MenuEdit ~</p>
<b>Data files</b>	present.tar

## ***Mail reader - GUI***

<b>Usage</b>	??
<b>Start</b>	BimboMail.Open ~ Several mail readers may be running in parallel.
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free BimboMail MailStorage~</p>

## **Demonstration**

### ***Vectorized/rasterized 3D menu - GUI***

<b>Usage</b>	<p>A 3D menu opens on the desktop.</p> <p>This application does not work.</p>
<b>Start</b>	<p>W3dMenu.Open fileName ~</p> <p>fileName: one of 4 XML files:  W3dFun.XML, W3dMenu.XML, W3dNetTools.XML,  W3dPersonal.XML using images extracted from .tar files.  The XML file describes the structure of the 3D menu, in particular the number of menu items represented by boxes.</p> <p>A 3D world opens on the desktop. Press and hold ML and move the mouse to rotate the axes. Additionally, press MR to zoom.</p> <p><b>Shortcut:</b> Main menu → Demos → 3d.Menu , uses data file W3dMenu.XML  Fails to work and traps.</p>
<b>Stop</b>	<p>Close the window.</p> <p>To clean up: SystemTools.Free W3dMenu W3dObjectGenerator Random W3dWorld W3dGeometry W3dRasterizer W3dAbstractWorld W3dMatrix W3dVectors TFClasses MathL~</p>
<b>Data files</b>	W3dFun.XML, W3dMenu.XML, W3dPersonal.XML, W3dNetTools.XML, W3dMenuIcons.tar, Cluster.XML (used by W3ClusterWatch.Mod and TestServer.Mod)

## 3D viewer - GUI

<b>Usage</b>	3D object rendering and manipulation. An image is placed in the axes.
<b>Start</b>	<p>W3dExplorer.Open ~</p> <p>A 3D world opens on the desktop. Press and hold ML and move the mouse to rotate the axes. Additionally, press MR to zoom. Key strokes condition the image aspect:</p> <ul style="list-style-type: none"> <li>„0“ the image grain varies ( „0“ is the starting value).</li> <li>„1“ idem</li> <li>„2“ idem</li> <li>„3“ wire frame view of the axes. No image.</li> <li>„s“ speed check – the time it takes to rotate the image by 360 degrees is displayed in the Kernel log in ms. Press “escape” to stop. The rotation stops only after a complete revolution.</li> </ul>
<b>Stop</b>	<p>Close the window.</p> <p>To clean up: SystemTools.Free W3dExplorer W3dObjectGenerator Random W3dWorld W3dGeometry W3dRasterizer TFClasses W3dAbstractWorld W3dMatrix W3dVectors MathL ~</p> <p>Error: fails to free and traps!</p>
<b>Data files</b>	BluebottlePic0.png

## Slide show - GUI

<b>Usage</b>	A simple slides how presentation tool with transitions effects.										
<b>Start</b>	<p>WMSlideshow.Open [fileName] ~</p> <p>Keyboard and mouse controls:</p> <table border="0"> <tr> <td>Next</td> <td>Spacebar/LeftMouseButton/PageDown/RightArrow</td> </tr> <tr> <td>Previous</td> <td>PageUp/LeftArrow</td> </tr> <tr> <td>First</td> <td>Home/UpArrow</td> </tr> <tr> <td>Last</td> <td>End/DownArrow</td> </tr> <tr> <td>Exit</td> <td>ESC</td> </tr> </table> <p>(Re)Open navigation panel "n"</p> <p>(Re)Open slide window "w"</p> <p>Show/Dump internal file list "l"</p> <p><b>Shortcut:</b> Main menu → Demos → SlideShow</p>	Next	Spacebar/LeftMouseButton/PageDown/RightArrow	Previous	PageUp/LeftArrow	First	Home/UpArrow	Last	End/DownArrow	Exit	ESC
Next	Spacebar/LeftMouseButton/PageDown/RightArrow										
Previous	PageUp/LeftArrow										
First	Home/UpArrow										
Last	End/DownArrow										
Exit	ESC										
<b>Stop</b>	<p>Close the window.</p> <p>To clean up: SystemTools.Free WMSlideshow WMTransitions ~</p>										
<b>Data files</b>	RetoSlideshow.XML, SlideShowData.tar										

## Fractal - GUI

<b>Usage</b>	A demonstration of fractals.
<b>Start</b>	<p>The demo requires to execute:</p> <p>FractalDemo.Register ~</p> <p>followed by ComponentViewer.Open FractalDemo.XML ~</p> <p><b>Shortcut:</b> Main menu → Demos → Fractal</p>
<b>Stop</b>	<p>Close the window.</p> <p>To clean up: SystemTools.Free ComponentViewer FractalDemo ~</p>

<b>Data files</b>	FractalDemo.XML
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## ***Turing - GUI***

<b>Usage</b>	
<b>Start</b>	<p>TuringCoatWnd.Open ~</p> <p>TuringCoatWnd.OpenAlpha ~</p> <p>Several Turing animations may be running in parallel.</p> <p><b>Shortcut:</b> Main menu → Demos → Fractal</p>
<b>Stop</b>	<p>Close the window(s).</p> <p>To clean up: SystemTools.Free TuringCoatWnd ~</p>
<b>Data file</b>	Window icon: WMLcons.tar://TuringCoatWnd.png

## ***Fractal voxel ray tracer - GUI***

A contribution of Soren Renner, found in the ocp repository

<https://www.ocp.inf.ethz.ch/svn/ocp/trunk/sr/tracer/>

The modules are prefixed “sr”.

Right now 39 ray tracer videos can be seen on:

<http://www.youtube.com/profile?user=xenopusRTRT>

where Soren Renner signs as xenopusRTRT's Channel. The video “filter 2.2” demonstrates that the videos were developed with A2 and the video “VNC tracer server and client” uses the A2 VNC server/client described above.

## **Games**

These are developed as additional program examples and not for using an A2 system as a gaming console. Games are of course welcome distractions and more would be welcome.

## ***Tetris - GUI***

Can serve as example of WMGraphics use.

<b>Rules</b>	<p>A familiar Tetris game. The peculiarity of this GUI component is that it is transparent. Press the „Space“ bar to start. The shape of the next block to fall from the top is announced at the top left.</p> <p>The cursor positioning keys have the following functions:</p> <ul style="list-style-type: none"> <li>Cursor right: move the block to the right</li> <li>Cursor left: move the block to the left</li> <li>Cursor up: rotate the block 90 degrees clockwise</li> <li>Cursor down: drop the block immediately</li> </ul> <p>Press „p“ to Pause and resume.</p> <p>The score is given in number of lines filled, number of blocks used, level ?, points scored. The game is over when blocks are piled up to the top.</p>
<b>Start</b>	<p>WMTetris.Open ~</p> <p>Several Tetris games may be running in parallel.</p>

	<b>Shortcut:</b> Main menu → Demos → Tetris
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free WMTetris ~
<b>Data file</b>	Window icon: WMIcons.tar://WMTetris.png

### ***Tetris server (extension of VNCServer)***

<b>Rules</b>	The Tetris game server which can be accessed by any VNC client connecting to port 5999.
<b>Start</b>	VNCTetrisServer.Run ~ acknowledged in the KernelLog with: „VNC Tetris server started“ Whenever a Tetris game terminates a status report line with the score is reported in the log.  VNCTetrisServer.StopNew ~ Stop the server. After restart, the game fails to run.
<b>Stop</b>	VNCTetrisServer.Uninstall ~ To clean up: SystemTools.Free VNCTetrisServer VNCServer ~
<b>Data files</b>	VNCTetris.dat

### ***VNC client of a Tetris server - GUI***

<b>Rules</b>	The same Tetris game as described previously except that a VNC client is used, the game starts immediately and the window is not transparent.
<b>Start</b>	VNC.Open serverName password 5999 ~ the password is necessary but any is valid.  serverName: the server domain name or IP address. Open a session and start the game immediately. Controlling it is as explained earlier. The state of the game appears at the bottom of the window: Score: Games active: Max concurrent: Served total: High score: Press p to toggle pause  Multiple sessions may exist. Each window is entitled: „serverName Port 5999 – VNC i“ where „i“ is the session number for discriminating multiple sessions.  Any other VNC client may also be used but recall to specify port 5999.
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free VNC ~

### ***Bimso - GUI***

Can serve as example of WMGraphics and WMDialogs use.

<b>Rules</b>	A memory test game. On pressing Start, a succession of flashing signals are emitted by four colored fields. Try to memorize their order. When no more signal is perceived, try to mimic the signal series by clicking the colored fields. At the first
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	mistake, the games stops and the level of dexterity is reported in a dialog window.
<b>Start</b>	Bimso.Open ~
<b>Stop</b>	Close the window(s). To clean up: SystemTools.Free Bimso ~

## ***Color (or Colored) lines - GUI***

Can serve as example of WMGraphics and WMDialogs use.

<b>Rules</b>	On a 19x19 board, 3 colored balls appear. Try to arrange balls of the same color in vertical, horizontal or diagonal lines. To move a ball, click on it to select, then click on a destination square. A ball can only move vertically and horizontally along free paths. Once a line has 4 or more balls of the same color, the line is removed from the board and the next move is allowed. When the move does not lead to a line removal, three balls of random color are randomly added to the board which becomes congested. The game is over when the board is filled up.
<b>Start</b>	WMLColorLines.Open ~
<b>Stop</b>	SystemTools.Free WMLColorLines ~ Remark: Cannot restart after simply closing the window.

## **Fun**

### ***Animated images - GUI***

<b>Purpose</b>	Insert animated images on the desktop. Images are extracted from WMBunnyImages.tar are moving on the desktop from left to right.
<b>Start</b>	WMBunny.Insert imgName [nofFrames step] ~ imgName: WMBunnyImages.tar://image – there are 9 images to chose from. nofFrames: the number of image components for an animation. Default is 8. step: . Default value is 32. Several images may be inserted.  <b>Shortcut:</b> Main menu → Demos → Bones <b>Shortcut:</b> Main menu → Demos → Bunny
<b>Stop</b>	Removing an image requires some dexterity: While moving, try a ML+MR inter-click in the approximative image area. With a bit of luck it is deleted.  WMBunny.Free ~ is the better way to kill all images.
<b>Data files</b>	WMBunnyImages.tar (9 images).

### ***Fantasy menu - GUI***

<b>Usage</b>	A test bed for a fantasy menu representing a heap of presents to be opened. When clicked with MM, each present opens an application chosen from the ones described in this paper. The fantasy menu is described by XmasMenu.XML.
<b>Start</b>	PresentViewer.Open XmasMenu.XML ~
<b>Stop</b>	Close the window.

	To clean up: SystemTools.Free PresentViewer ~
<b>Data files</b>	XmasMenu.XML, present.tar

## ***Christmas snow - GUI***

<b>Purpose</b>	Let it snow two small gifts icons Flake1.png and Flake2.png from the top of the screen in random order. The icons are extracted from xmas04.tar created on the occasion of Christmas 2004.
<b>Start</b>	Snow.Snow [nofFlakes] ~ nofFlakes: . Default value is DefaultNofFlakes = 20
<b>Stop</b>	SystemTools.Free Snow ~
<b>Data files</b>	xmas04.tar

## **WinAos notes**

The web site serving as starting point is [www.ocp.inf.ethz.ch/wiki/OCP/WinAos](http://www.ocp.inf.ethz.ch/wiki/OCP/WinAos) . “Some notes on WinAos” written by Felix Friedrich introduces the reader to the matter:

<http://www.ocp.inf.ethz.ch/wiki/OCP/WinAos?action=download&upname=WinAos.pdf>

## ***Windows command line interpreter activator***

<b>Usage</b>	Allows to start A2 from a Windows command line and at the same time to open any number of text files in A2. In Windows, use one of these:	
	Open the command interpreter C:\WINDOWS\system32\cmd.exe	and execute aos {fileName} With “aos” only, A2 is started and no more.
	Select any number of text files and drag and drop them	onto Aos(.exe) in the WinAos directory
<b>Start</b>	CommandLine.Open ~ Parse the Windows command line when WinAos is started and execute the commands. It is useful to add the command to the Autostart section of Configuration.XML.	
<b>Stop</b>	To clean up: SystemTools.Free CommandLine ~	
<b>Build</b>	WinAos, eWinAos	

## ***Avira virus warning***

On a Windows installation protected by Avira, one may receive a report that Aos.exe contains the Trojan horse virus TR/Crypt.XPACK.Gen. One can safely ignore the alarm and proceed with starting A2. The error was reported to the publishers of Avira. The warning should disappear sooner or later.

## **Packages, Release builds and Ports**

The developers' objective is to port A2 to the widest possible range of platforms (target

CPUs and operating systems), though some applications developed for the native system might not be portable in case A2 is hosted by a third party operating system. Also, for practical reasons, the entire system is divided into “packages” or collections of applications of a given type. A user can thus choose to deploy all of the packages or only some of them so as not to overload an installation. Packages are defined, that is described, in the Release.Tool file. In the same file, a “Build” section describes the components of a specific build. All builds include the relevant source code. The file License.Text, included in a build, contains the copyright information.

Whenever an original A2 source code module must be adapted for porting it, the ported module name is prefixed so as to assign a unique name. Also a number of additional modules needed by the ports have prefixed source module names.

These tables summarize the various builds which can be produced for a given A2 release:

### ***Native, running on bare hardware***

Build	Target CPU	Source module prefix	Object module extension	Excluded packages
<b>A2</b>	i386	---	.Obx	---
<b>A2Mini</b>	i386	---	.Obx	Applications, GuiApplications, Fun, Testing, Education, Contributions, Oberon, OberonGadgets, OberonApplications, OberonDocumentation, OberonVoyager, OberonAnts
AMD64	AMD64	AMD64.	.Abx	Contributions, Oberon, OberonGadgets, OberonApplications, OberonDocumentation, OberonVoyager, OberonAnts
---	ARM	PC*ARM.	.Oba	all

The latest builds of A2 and A2Mini, as bootable ISO CD-images, can be downloaded from [bluebottle.ethz.ch/download.html](http://bluebottle.ethz.ch/download.html) for burning a live CD.

AMD64 is in development.

The ARM Xscale processor support is not up-to-date.

Other builds can be downloaded from [www.ocp.inf.ethz.ch/wiki/OCP/Downloads](http://www.ocp.inf.ethz.ch/wiki/OCP/Downloads) :

### ***Windows is host***

Build	Target CPU	Source module prefix	Object module extension	Excluded packages
WinAos eWinAos	i386	Win32.	.Obw	---

### ***Unix is host***

Build	Target CPU	Source module prefix	Object module extension	Excluded packages
LinuxAos	i386	Linux. & Unix.	.Obj	OberonVoyager, OberonAnts
DarwinAos		Darwin. & Unix.		
SolarisAos		Solaris. & Unix.		

## ***Qemu is host***

A2 / A2Mini	Use a bootable A2 or A2Mini CD. Not tested
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## ***VirtualBox is host***

A2 / A2Mini	Use a bootable A2 or A2Mini CD. Only A2 can be installed on a virtual disk. Experience shows that the system is very sluggish.
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## ***VirtualPC is host***

A2 / A2Mini	Use a bootable A2 or A2Mini CD. Not tested.
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## ***VMWare is host***

A2	Raw image of A2 for use with VMWare Player, VMWare Workstation or, on iMac, WMWare Fusion.
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When required, a user can trim the Release.Tool text to customize a build at will.

## **Developers**

A2 is being developed by the [Native Systems Research Group](#) headed by Prof. Dr. Jürg Gutknecht in the [Department of Computer Science](#) at ETH, the Swiss Federal Technical University in Zürich.

The current developers are, at this date in 2009:

Dr. Felix Friedrich  
Ulrike Glavitsch  
Thomas Kägi-Trachsel  
Florian Negele  
Sven Stauber

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