Maya / WorldBuilder Communicator

Scene Communication and Project Sharing for
Maya 4.5 (or higher) **and** ***WorldBuilder Pro 3.55***

Developed By SUE ”Strela”

1 Introduction

The Maya/WorldBuilder Communicator (MWC) revolutionizes importing and exporting between packages, by allowing Maya and WorldBuilder Pro users to share scene data and utilize the strength of each package. The communicator supports joint rendering of 3D-packages with fusion of images at the level of Z-buffers or A- buffers.

With MWC, users no longer import and export objects in the traditional sense. Rather, they create a combined project file, which shares camera paths, lighting, and shadows between both scenes. Each package renders part of the scene in its native renderer. MWC composites the renders together for the user, creating a single scene. All the objects are transferred and received with animation support.

The following items are shared communicated between scenes:

- Mesh objects (Mesh),
- Light sources (Light),
- Cameras (Camera),
- Null objects and
- Other objects, which are bound by a bounding box.

1.1 Compatibility and Components

MWC is PC-only and is compatible with Windows-based operating systems including Windows 2000, Windows NT, Windows Millennium, and Windows XP. MWC works with projects created in Maya 4.5 (or higher) and higher and WorldBuilder Pro 3.55. It consists of the following components:

- Communication server (Server),
- User interface of communication server (UI),
- Plugin for Maya 4.5 or higher (Maya plugin) and
- Plugin for WorldBuilder Pro 3.55 (WB plugin).

1.2 System Requirements

This represents the system requirements MWC. WorldBuilder Pro and Maya may have additional system requirements to function properly.

Minimum:

Processor	Pentium II 400 MHz
Memory	128 Mb
Free disc space	1 Mb
Operating system	Windows 2000/Windows XP

Recommended:

Processor	Pentium IV 1400 MHz
Memory	512 Mb
Free disc space	17 Mb
Operating system	Windows 2000/Windows XP

2 Installation

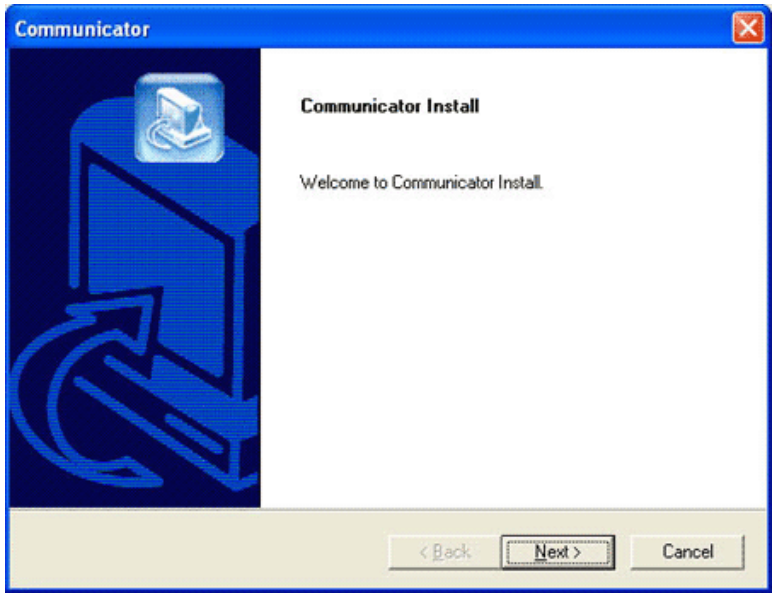
2.1 General Installation of *Maya-WB Communicator*

To install the *Maya-WB Communicator* you need to have Maya 4.5 (or higher) and WorldBuilder Pro 3.55 already installed on the workstation. The following files will be installed on the computer:

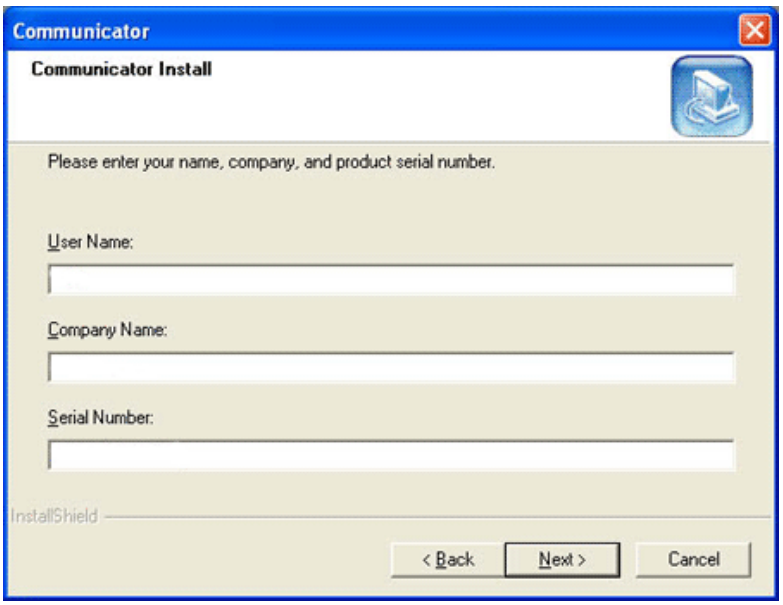
Communicator.mll	Plugin for Maya
CommObject.bem	Plugin for WB
CommServer.exe	Communication server
CommUI.exe	User interface of communication server
MayaWB.pdf	Operating document (Adobe document)

To install the software components of *Maya-WB Communicator*, run the program **CommMaya-WB.exe** and follow some easy steps.

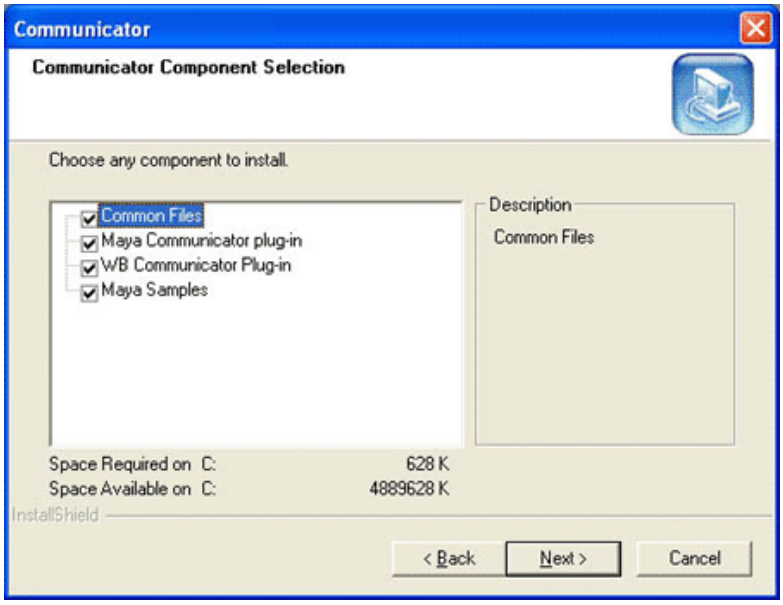
From the window prompting the installation, select desired setup type and click **'Next>'** button**:**



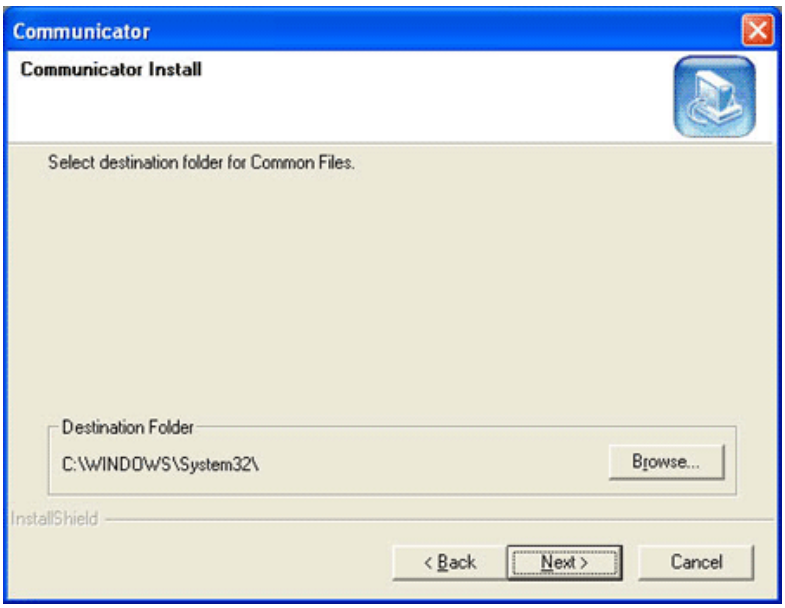
Enter required parameters:



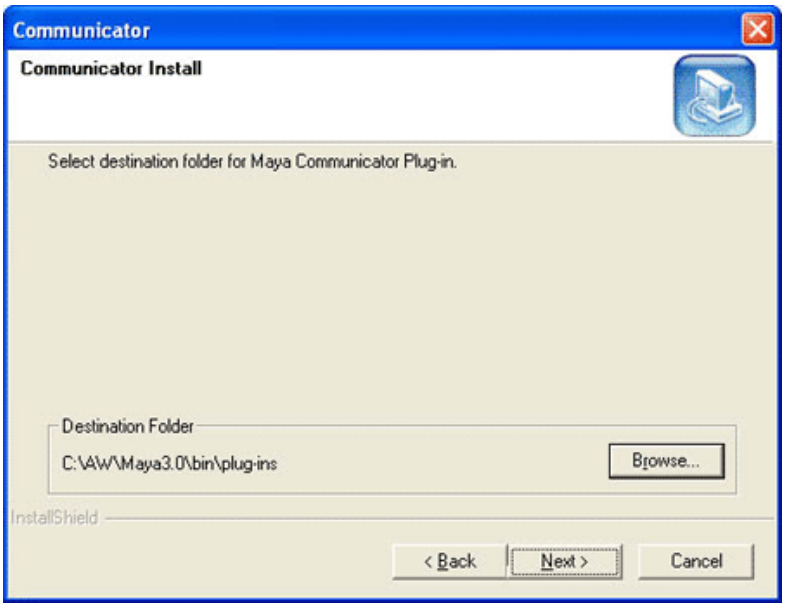
In the proposed list of the components for installing *Maya-WB Communicator* select the desired components. All the components are indicated chosen by default. To continue click **'Next>'** button**:**



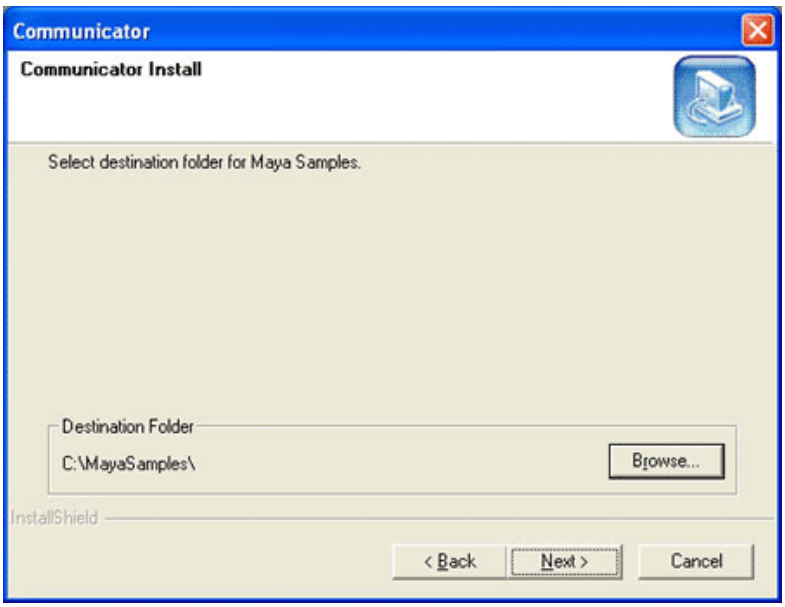
The files of communication server **CommServer.exe** and **CommUI.exe** are placed into the **Windows** system directory and are automatically recorded in the operating system. Click **'Next>'** button in the below window**:**



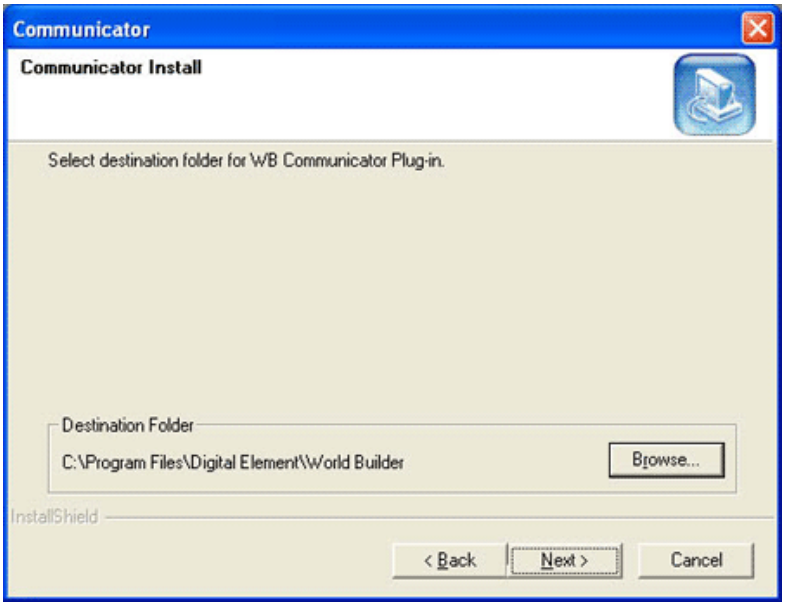
The program determines itself the location of the package Maya 4.5 (or higher) and offers to record the *Maya plugin* file **Communicator.mll** into the plugin directory (**\AW\Maya**X.X**\bin\plug-ins** by default). Click **'Next>'** button in the below window**:**



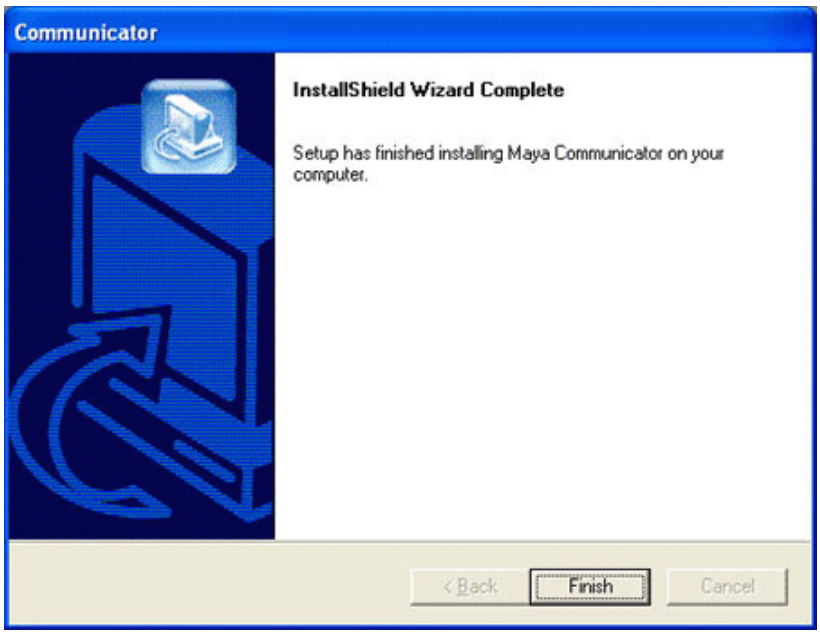
Select destination folder for Maya scene samples. Click **'Next>'** button in the below window**:**



The program offers automatic finding the path to the installed WB package or you may find the path manually, then the file of WB plugin **CommObject.bem** will be recorded into the plugin directory: **C:\Program Files\Digital Element\World Builder**. Click **'Next>'** button in the below window**:**



To finish the general installation click **'Finish'** button in the below window:



At any stage of the installation you may

- Move one step backward with **'<Back'** button,
- Abort the installation with **'Cancel'** button.

2.2 Security

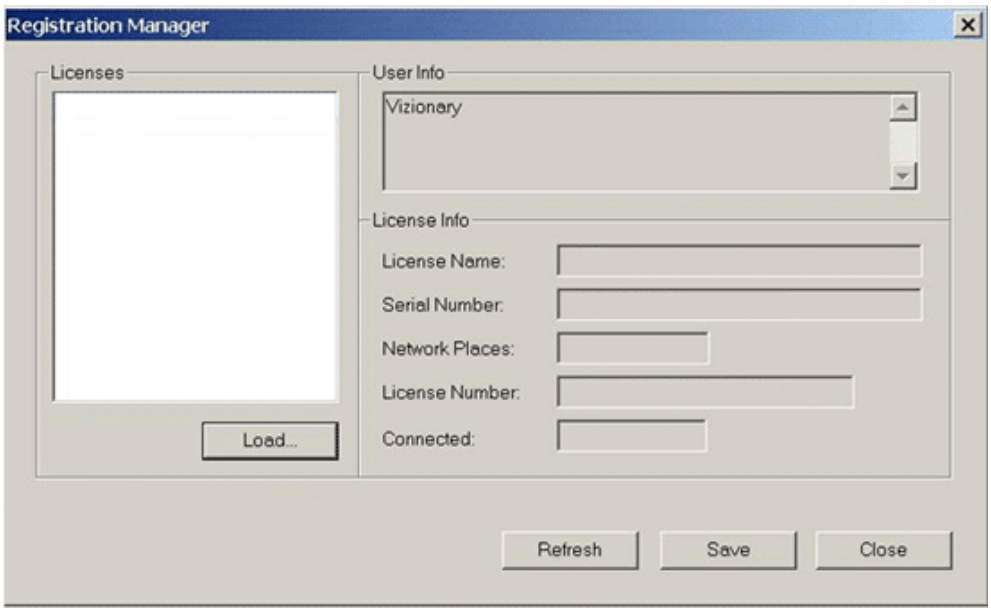
When installing Maya plugin user name and serial number is requested.

User takes request to the supplier, where gives a name and a serial number. When the license file (***.lic)** is got from the supplier, it must be saved in any place on the user's machine.

Then Maya plugin must be registered at the server.

To do this:

1. Run the program **RegManagerUI.exe**.
2. In the dialog box **"Registration Manager"** click the button Load... . In the opened dialogue discover a license file .



3. Click the button Save in the dialog box **"Registration Manager"**.
4. Close the dialog box of the program **RegManagerUI.exe**.

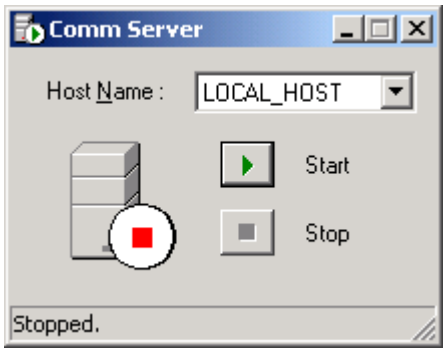
The registration of Maya plugin is now finished.

When starting Maya plugin the availability of the license file is checked at first. If it is available, the correctness of the license and its availability at the server is checked. If something is wrong, the message is sent telling about a mistake nature.

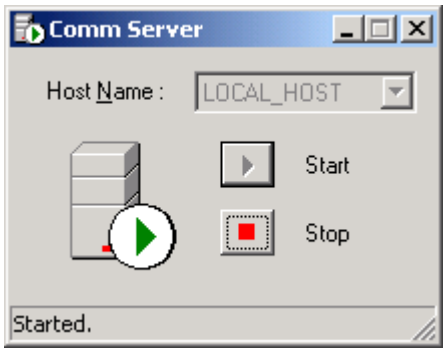
2.3 Loading the Communication Server

The communication server (**CommServer.exe**) represents a separate communicator component placed on one of computers in a network or on the local computer. The communication server facilitates interaction between the rest of the components of the Communicator and controls the interaction. All other communicator components interact with server using sockets based on the TCP/ IP protocol.

Control dialog of the communication server:



Off mode



Operating mode

The communication server may be turned either on or off. To switch between the modes use the buttons ***Start*** and ***Stop***.

For the server to operate, specify the parameter:

Host Name — When on a network with network rendering, select the network name of the host server from the list of computers visible on the network. When working on a local computer without network rendering, you should select LOCAL HOST.

2.4 Loading Maya Plugin

Load the package Maya 4.5 (or higher).

To record and load the plugin in the package Maya 4.5 (or higher) it is necessary to:

1. Call for the window **Plug-in Manager** from

   Window->Settings/Preferences->Plug-in Manager.

2. In this window in the line for **Communicator.mll** place a tick in the fields **loaded** and **auto load** for the communicator can be automatically loaded at successive runs of Maya 4.5 (or higher) package (see Fig. 1).

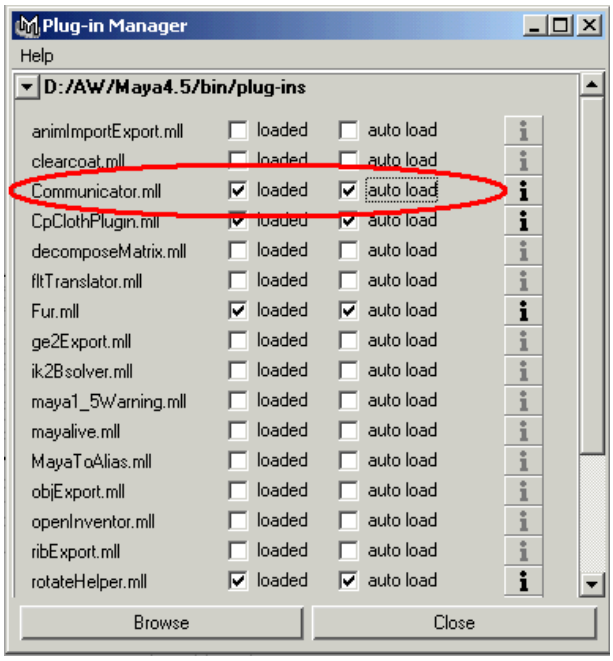


Fig.1 Loading of Maya plugin

3. If the Maya communicator plugin was installed into some other directory and the line for **Communicator.mll** is absent, it is necessary to select a directory with the Maya communicator plugin by clicking the button **Browse** in the left bottom corner.

4. Activate the plugin for its setting and for connecting with the communication server of packages communication. To do this you must type and run MEL (built-in commands) **commObj** (Fig. 2.) in Maya 4.5 (or higher) command line

Fig. 2. Command for activating Maya plugin.

Maya-WB communicator is loaded and the user interface is called for setting parameters of the session of plugin Maya connecting to communication server.

2.5 Connecting Maya Plugin to Communication Server

The installation of the *Maya-WB Communicator* and Maya plugin results in the dialog box for setting the parameters of the session of connection of Maya plugin to communication server (Fig. 3).

Fig. 3 Dialog box in Maya for setting parameters for session of connection of Maya plugin to communication server.

Description of the input fields and buttons.

Session	Since the server can support a large number of workstations and sessions (projects) running simultaneously, users need to enter a unique name for each project. Workstations accessing identical session names operate jointly. A given workstation does not see workstations that participate in other projects (with different session identifiers). When the plugin is connected to the server, the availability of a session with a given name is checked. If such session is not present, it is created with specified parameters. The default session name is «session». At the beginning of the operation the input field is accessible. If the connection is a success, it becomes inaccessible.
Password	Prevents an unintentional connection to a session. If while connecting to the server the session specified by a user is already available, then the passwords coincidence is checked, and if they coincide in their turn, the connecting goes on; otherwise the error message appears. The default password is «password». At the beginning of the operation the input field is accessible. If the connection is a success, it becomes inaccessible.

UID	**"Package Name"** Within a session, each connected package has its unique name specified by the user. With this name the server identifies the objects, which are transferred through it. The check for uniqueness of a package name takes place immediately after checking session name and password. In the case of duplicate package name, the user receives a message about non-uniqueness of the package name. At the beginning of the operation the input field is accessible. If the connection is a success, it becomes inaccessible.
Server path	**"Network Path"** The communication server may be placed on any machine within a network. A user may specify the computer (IP-adress) where the server is placed. At the beginning of the operation the input field is accessible. If the connection is a success, it becomes inaccessible.
Go	 If pressed, workstation attempts to connect to the server with the specified parameters. At the beginning of the operation the button is clickable. If the connection is a success, it becomes unclickable.
Logout	 Disconnects the workstation from the server. At the beginning of the operation the button is unclickable. If the connection is a success, it becomes clickable.
User Interface	 Brings up the server user interface. At the beginning of the operation the button is unclickable. If the connection is a success, it becomes clickable. On successful connection to the communication, you may call the server user interface UI and proceed to manipulating with the scene objects.

2.6 Loading WB Plugin

1. Load the package WorldBuilder Pro 3.55.
2. 

Click this button on the left vertical functional panel in the main WorldBuilder interface. WB plugin in WorldBuilder Pro 3.55package will load:

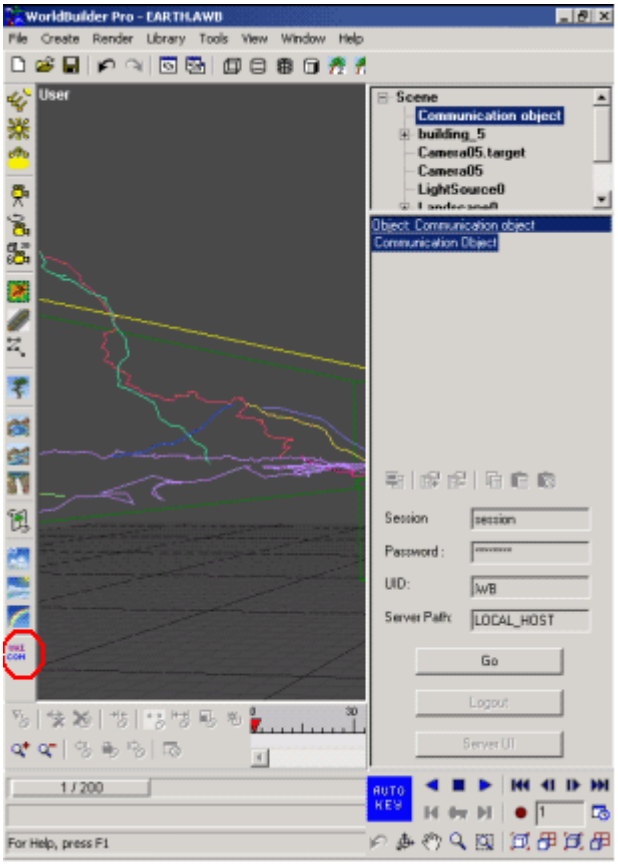


Fig. 4 Main WB interface with marked ***UNICOM*** button.

At this the user interface of WB communicator plugin is called (Fig. 5).

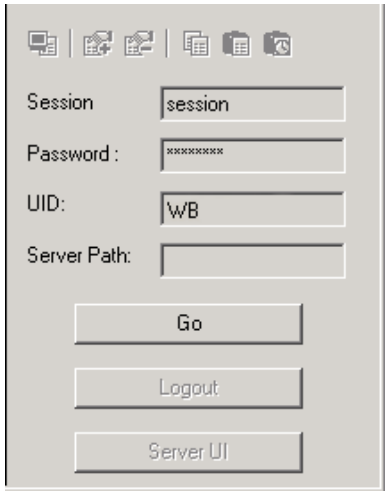


Fig. 5 Dialog box in WB for setting parameters for session of connection of WB plugin to communication server.

2.7 Connecting WB Plugin to Communication Server

The loading of WB plugin results in the dialog box for setting the parameters of the connection session with the WB plugin and the communication server

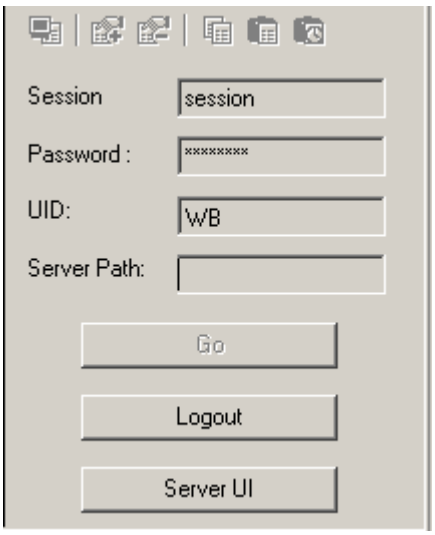
- With the input fields: *Session («session name»)*, *Password («password»)*, *UID («package name»)*, *Server path («network path»))* and
- With the buttons *Go («Go»)*, *Logout («Logout»)*, *Server UI («User Interface»)*.

The functionality of the input fields and the buttons is similar to the description for Maya plugin presented in section 2.5.

To connect WB plugin to communication server click the button 

.

Dialog box will be changed to the following:



3 User Interface of Communication Server

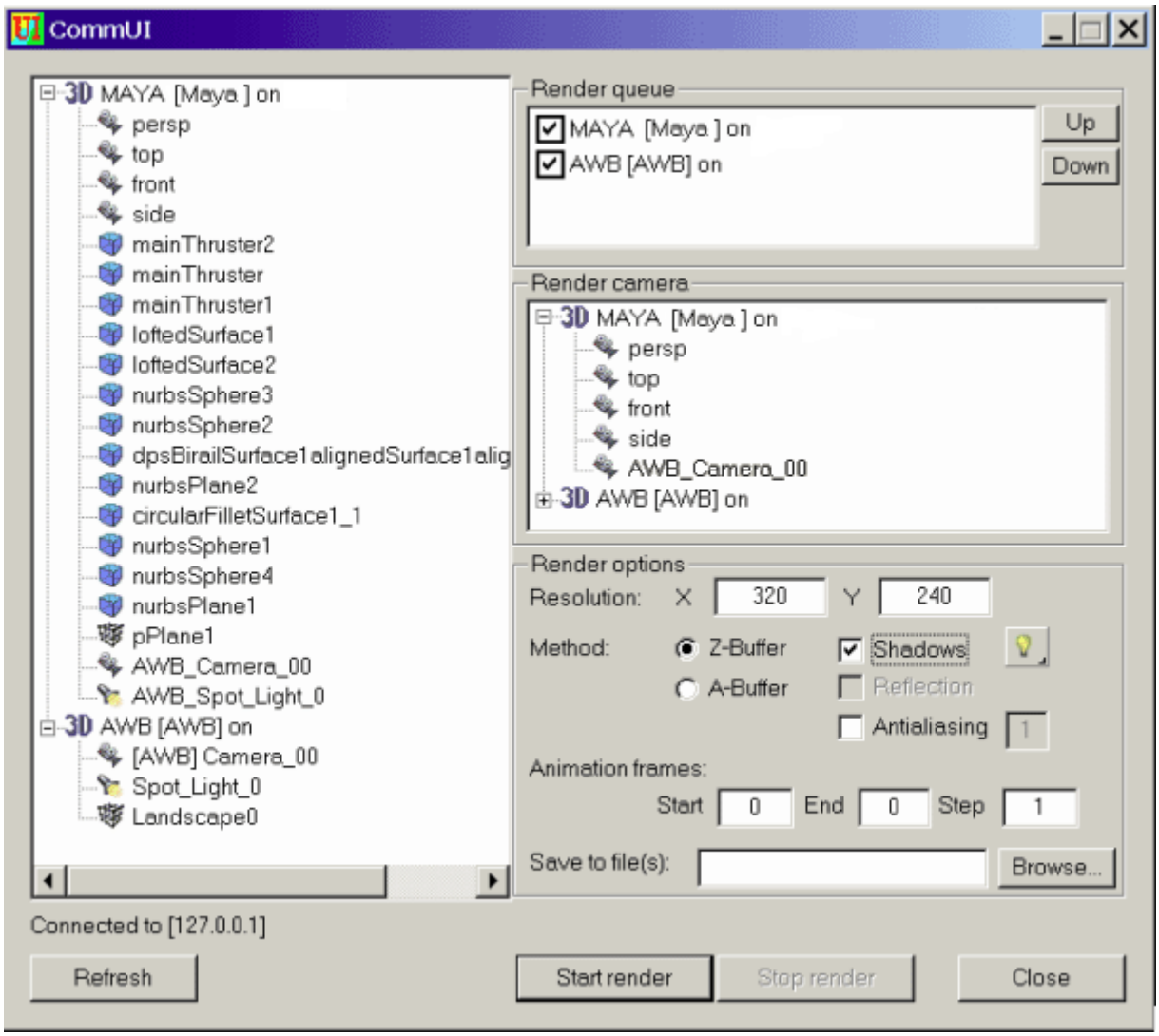


Fig. 6. Example of interface of communication server with objects transferred from one package into another.

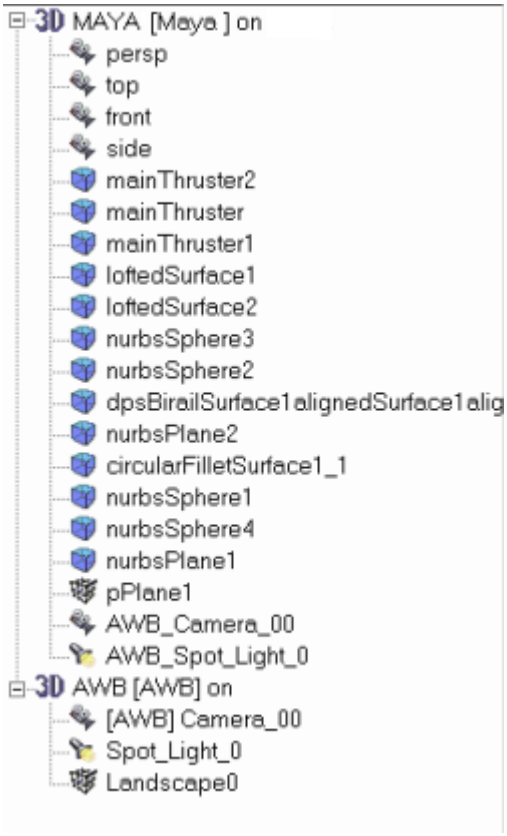
The user interface window of the communication server is divided functionally into the two parts:

- **Scene objects.** A left panel for manipulating with scene objects.
- **Render panels**. Panels for setting parameters and starting joint rendering.

Note. Before starting operating with the communicator open 3D-packages, download demoscenes and reduce the packages to the common system of units!

4 Manipulations with Scene Objects

In the left part of the window of the user interface of the communication server **"CommUI"** there is an object lists for each package.



The lists are organized in a hierarchical trees. Any object may act as a parent and have children (slaves). The number of children levels is not limited. The hierarchical structure provides control when manipulating objects of two different packages.

The following manipulations may be done with objects:

- Transferring objects
- Deleting objects
- Modifying dimensions

If you click with the right button into the list box of packages objects a popup menu is displayed providing commands for manipulations with objects, synchronization and updating objects lists.

Transferring objects

Transferring an object:

1. Select the object from the Object Tree of one of the two packages by clicking the **left mouse button**.
2. Hold the button and drag the object to the required level of the Object Tree of the other package.
3. Release the mouse button. The object will be copied into the list of the second package.

Simultaneous transfer of several objects:

Transfer procedure is similar to that described above:

1. Several objects are selected with **Ctrl-left click**.
2. A parent object is transferred with all its children.

When being transferred the object is assigned a name, which is formed according to the following principle:

"[" package name (UID field in plugin interface) "]"

+

space (_)

+

original name of the object in a package.

When transferring polygonal objects into Maya from WorldBuilder the names, which are assigned to the objects, differ with an underlining symbol (**_**) instead of a space.

Example:
If a polygonal object with the name ***"Landscape()"*** is transferred from WorldBuilder package with UID ***«wb»*** the object name will be formed:
«[wb]_Landscape()»

Objects may be transferred with the commands from the popup menu.

Note. Before transferring objects it is necessary to set in all 3D-packages the unified system of units of measurement!

Deleting objects

To delete one or more objects from a scene, mark the objects with the mouse and press the **Del** key.

If a scene object is deleted in a package itself, then to update the object list click the button 

in the bottom left corner of the window of the user interface of the communication server **"CommUI"** (Fig. 6).

Objects may be deleted from the popup menu.

Modifying dimensions

When an object has been transferred, it may be necessary to modify its dimensions. To do this one may:

- Use the appropriate tools of the package, into which it (the object) was transferred;
- Modify beforehand the location of the object and its scale before it is transferred into another package.

Popup menu

Copy	The command copies a selected object or several selected objects into the buffer. If you select a parent object, all its children are copied.
CopyOne	The command copies a selected object into the buffer. If you select several objects without children simultaneously, they are all copied. If you select a parent object, its children are not copied.
Paste	The command pastes information from the buffer into the specified place in the list.
Delete	The command deletes the selected objects from the list. If you select a parent object, all its children are deleted as well.
SyncCopy	The command updates the object copies in other packages.
SyncOriginal	The command updates the original.
Refresh	The command updates the objects lists under any changes of scene in package.

Note. When some animated objects are transferred from one package into another, one should remember that in different packages a different number of frames and different numbers of the startup frame are specified by default, therefore one should trace carefully the installation of these parameters in the packages, with which communication is performed. Otherwise the animation of the scene objects may be distorted.

5 Joint Rendering

Joint rendering matches rendered scene objects between packages during the rendering process by sharing cameras, light sources, etc. of the respective packages. MWC composites the results of scene objects' renderings in each package. In other words, MWC merges the Z-buffers and/or A-buffers of the packages.

If rendering was absent in one of the packages, then the result of joint rendering is the rendering of that package in which the rendering took place. If rendering took place in both packages, then the result will be the combination of the two renderings.

In connection with peculiarities of the package render to obtain

transparency it is required to disable - **Raytracing** in **Render Global**

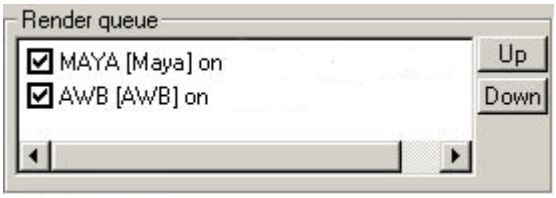
Settings -> Raytracing Quality.

In order to construct correctly objects' shadows in the combined scene, light sources need to be exchanged between packages and, depending on the package, to adjust the parameters responsible for shadows formation (for example, in WB for the necessary light source the parameter **Shadow** is to be set to **ON**).

For joint rendering of the scene objects from different packages there are three panels for setting parameters in the window of user interface of communication server:

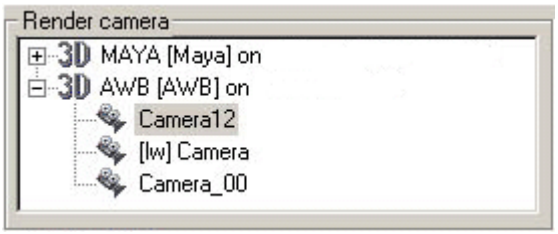
- **Render queue.** Queue of package rendering.
- **Render camera.** Camera selection.
- **Render options.** Setting of the rendering parameters.

Render queue (List of packages)



The list of package names is displayed in a panel. Each title string includes a flag. The package, the title string of which includes a flag performs rendering. If flags are set on all the packages in the list, the order of rendering will follow the order in the list. The order of packages within the list may be changed with the buttons Up and Down to the right of the panel.

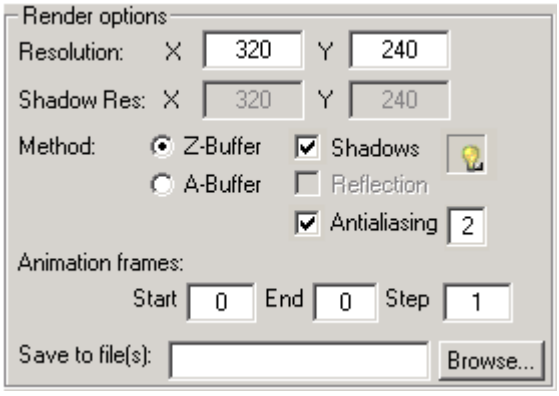
Render camera (Camera selection).



On the panel a user may select a camera of one package, from which rendering will be performed. The string with a camera name indicated with a mouse will be colored marked.

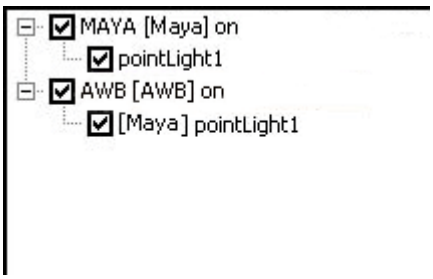
Render options

Before proceed to joint rendering a user may set the rendering parameters on that panel, namely:



Resolution	Changes the resolution of the resulting image.
Shadow Res	To adjust the resolution value for shadow masks. The default resolution value for shadow masks is equal to the resolution value for the resulting image. Is available when ☑**Shadows** is selected.
Method	Chooses a compositing method – ⊙*Z-buffer* or ⊙*A-buffer.*
☑**Shadows**	Determines whether shadows will be processed.
☑**Antialiasing**	Set a flag and specify the required rate of smoothing (an integer number from **1** to **7**, recommend – **3**). The given antialiasing coefficient has no effect on the dimension of shadow masks.
Animation frames	Change initial and final animation frame and step if any provided.
Save to file(s)	Saves the resulting image into the chosen file.

If **Shadows** have been selected, light sources will have to be shared. To set the light sources required for shadow creation, click the button  . The list of light sources of both packages will be displayed. In the displayed list set the flags at the required sources:



When the required parameters have been set, click 

button at the bottom of the panels to begin the joint render. The rendering will take an amount of time that varies depending on the complexity of the scenes, the power and number of stations, and the quality of the render. Clicking the button 

will stop the joint render.

Example 1

The following figures present the examples of separate rendering of the initial scenes in packages Maya and WorldBuilder Pro:

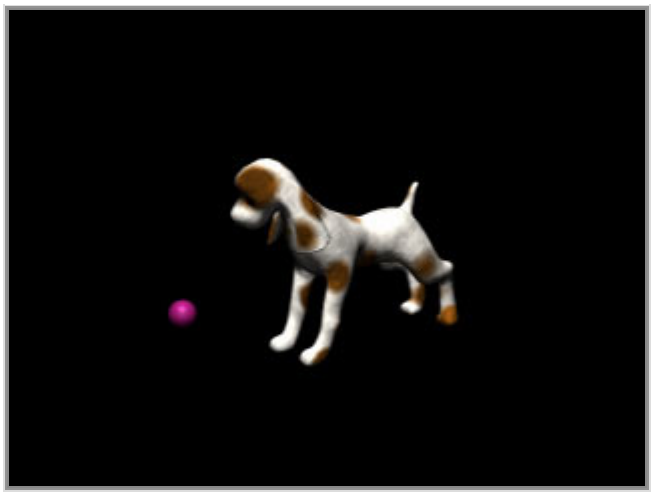


Image obtained in Maya

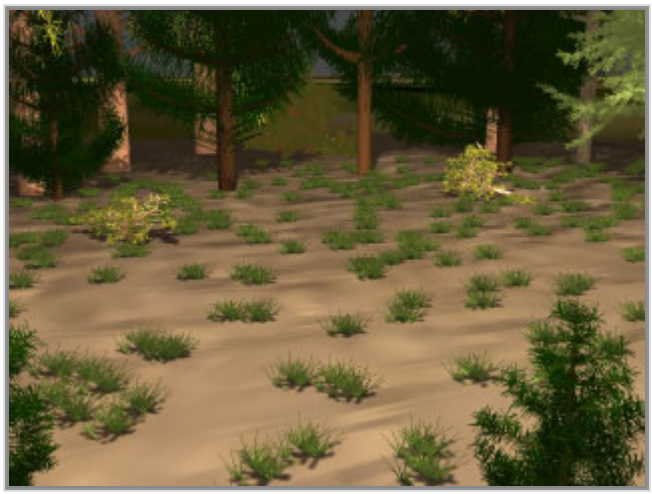


Image obtained in WorldBuilder Pro

The given Figure presents the resulting image in server interface obtained by joint rendering that is by merging of two Z-buffers:

Resulting image obtained by joining Z-buffers under joint rendering

Example 2

The following Figure presents the example of support of image visualization by the ***A-buffer*** method. What sets apart this visualization mode is the ability for full-value work with the objects with different transparency degrees. Note that there is a considerable increase in the time required for rendering.

Image obtained in Maya

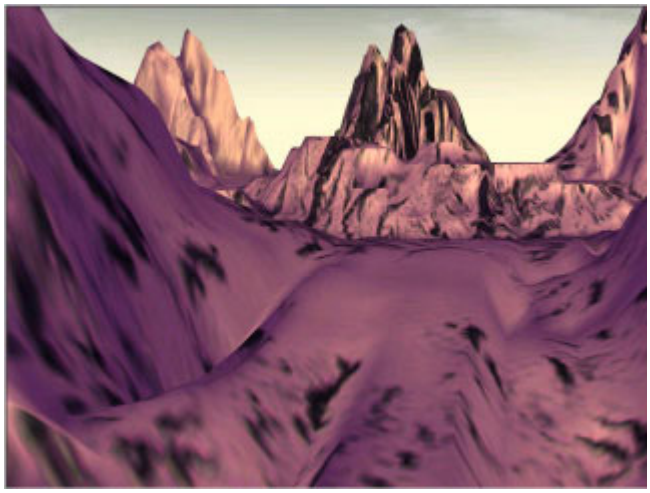
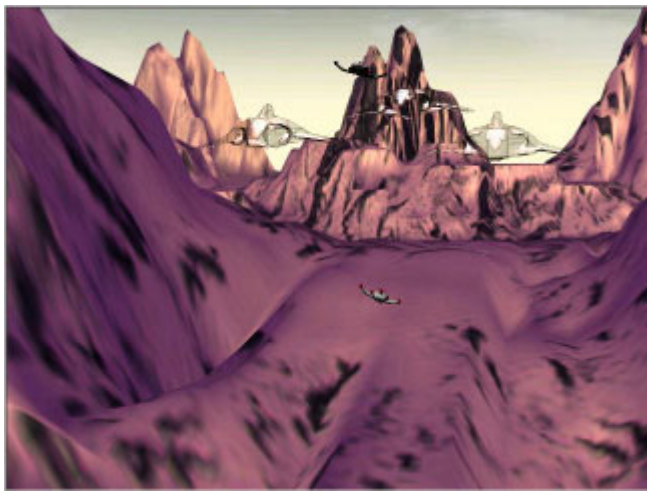


Image obtained in WorldBuilder Pro



Resulting image obtained by joining A-buffers under joint rendering

Example 3

The following picture presents an example of shadows support in general scene. The shadow from a tree is created in WorldBuilder Pro, the shadow from a starfighter - in Maya. The shadow created in WorldBuilder is imposed on the object created in Maya, and vice versa:

Credits:

Maya v.4.5 (or higher)
USA, Alias|Wavefront

WorldBuilder Pro v.3.55
USA, Digital Element, Inc.

Maya-WB Communicator
Russia, Sue "Strela",
USA, Digital Element