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## What is SimServer?

SimServer aims to offer a way to easily deploy VTD components on single or multiple hosts, set up environments for simulation, load & unload components and terminate the simulation.

Generally you can think of it as the alternative way to preparing VTD environment variables by simSettings.cfg, envSettings.cfg, taskSettings.cfg and loading/unloading components here and there by hands in VTD 1.4.x.

## Format of SimServer's Config file

Here is an example of setup file for SimServer. Three points should be noted:

- Environment variable VTD\_ROOT should be set as a prerequisite.
- You can extract the value of a variable by '\$' as in shell, and the order of variables definition matters.
- For Hosts and Processes 'name' is their ID so you don't want to mix them up unless hacking is your intention.

Elements in simServer.xml.

- **SimServer**: configuration of SimServer Master, which will be inherited by Slaves.

```
<SimServer name="Standard" comPort="32512" idleRate="20" workRate="33" notifyLvl="INFO" logName="taskRec_SimServer."
```

For most customers the configuration should be as below:

```
<SimServer name="Standard"/>
```

Attribute	Description	Value	Default	Appearance	Note
name	setup name	string	Standard	<b>required</b>	you may not want to change it at the moment
comPort	SCP listening port of SimServer	unsigned	32512	optional	Environment variable PORT_SIMSERVER is set up by it
idleRate	working rate in idle mode	unsigned	20	optional	
workRate	working rate in working mode	unsigned	33	optional	
notifyLvl	Notification level, such as DEBUG, INFO, NOTICE, WARN, FATAL, WARN	string	INFO	optional	
logDir	Log directory for SimServer Master&Slave	string	/tmp	optional	The directory is only for SimServer's log file not other components
logName	Log name for SimServer Master	string	taskRec_SimServer.txt	optional	Rename it if there is another VTD instance on the same machine

- **Data**: the mark where the real configuration begins.
- **EnvVar**: environment variable, has three levels global, host and process. The same environment defined in former level will be overwritten by latter level. Value of a variable can be extracted by '\$' like in a shell, and the order of variables definition matters.

```
<EnvVar name="LD_LIBRARY_PATH" val="$LD_LIBRARY_PATH:$VI_CORE_DIR/Framework/lib" />
<EnvVar name="LD_LIBRARY_PATH" val="$LD_LIBRARY_PATH:$VI_CORE_DIR/SensorManager/lib" />
<EnvVar name="LD_LIBRARY_PATH" val="$LD_LIBRARY_PATH:$VI_CORE_DIR/DynamicsManager/lib" />
<EnvVar name="LD_LIBRARY_PATH" val="$LD_LIBRARY_PATH:$VI_CORE_DIR/ModuleManager/lib" />
<EnvVar name="LD_LIBRARY_PATH" val=".: $LD_LIBRARY_PATH" />
```

Attribute	Description	Value	Default	Appearance	Note
name	environment variable name	string	empty string	<b>required</b>	Case sensitive
val	environment variable value	string	empty string	<b>required</b>	Case sensitive

- **Host**: element Host defines where all **Process** inside will be running. On each host runs a SimServer Slave, including the localhost.

```
<Host name="vtdhost"/>
```

Attribute	Description	Value	Default	Appearance	Note
name	host name	string	localhost	optional for localhost, <b>required by remote hosts</b>	name server should be set up properly before running SimServer. If not specified default value localhost will be assigned
logDir	Slave log file directory	string	/tmp	optional	Overwrite the slave's log file directory inherited from the Master (namely the element <SimServer/>'
logName	Slave log file name	string	taskRec_SimServerSlave.txt	optional	Overwrite the slave's log file name inherited from the Master (namely the element <SimServer/>', Rename it if there is another VTD instance on the same machine
vtdRoot	VTD_ROOT for this host	string	value of environment variable 'VTD_ROOT'	optional for localhost, <b>required by remote hosts</b>	
username	user's name logged in on this host	string	current user	optional for localhost, <b>required by remote hosts</b>	the user should be able to log on the remote host without password

- **Process:** represent a component, such as TaskControl, ImageGenerator, ModuleManager, VtGui, GhostDriver and any other components.

```
<Process
  group="igGroup"
  name="igCtr"
  auto="false"
  explicitLoad="false"
  path="$VI_CORE_DIR/ImageGenerator/bin"
  executable="vigcar"
  cmdline="$VI_CURRENT_SETUP/Config/ImageGenerator/AutoCfg.xml"
  useXterm="true"
  xtermOptions="-fg Black -bg LightGoldenRod -geometry 80x10+508+163"
  affinitymask="0xFF"
  schedPolicy="SCHED_RR"
  schedPriority="20"
  workDir="$VI_CURRENT_SETUP/Bin">
</Process>
```

Attribute	Description	Value	Default	Appearance	Note
affinitymask	CPU affinity	hexadecimal	0xFF	optional	
auto	component loaded once SimServer ready to start	true or false	false	optional	
cmdline	command line passed to component as loading it	string with blank inter options	empty string	optional	this is not the complete command line passed to a component when it gets started, 'cmdlineTail' will be added back
cmdlineTail	command line extent as ending	string with blank inter options	empty string	optional	cmdlineTail is mainly used to load a component with additional command line, such as ScenarioEditor needs specify a scenario when loading it
detached	to survive the command Terminate	true or false	false	optional	detached component could be unloaded explicitly or by command Unload/Reload detached noted.
executable	name of the executable, without the path to it	string	empty string	<b>required</b>	
explicitLoad	ignore command Load without specifying a component's name	true or false	false	optional	component with this flag will only be loaded by its name
group	group of components	string	default	optional	command with a group will be executed on all components in the group, group <b>default</b> is reserved.
name	component name	string	empty string	<b>required</b>	has to be unique over all components
schedPolicy	schedule policy	SCHED_RR, SCHED_FIFO, SCHED_BATCH, SCHED_OTHER	SCHED_OTHER	optional	only valid for super user.
schedPriority	schedule priority	0	-20 to 20	optional	namely the nice value
path	path to the executable	string	empty string	optional	if path not specified locate the program based on environment variable PATH

persistent	to survive command Unload/Reload without specifying a component's name	true or false	false	optional	persistent component could be unloaded explicitly or by command Unload/Reload persistent noted.
useXterm	to get started by xterm	true or false	true	optional	
workDir	working directory	string	."	optional	absolute or relative path to SimServer working directory
xtermOptions	command line of starting xterm	string with blank inter options	empty string	optional	only needed when useXterm is true

## Advanced Setup

### Run ImageGenerator on the discrete video card using Bumblebee

Make sure Bumblebee is installed, well configured and the daemon is started. Then adapt the simServer.xml in your Setup as following:

```
<Process
  group="igGroup"
  name="igCtr"
  ...
  path="/usr/bin"
  executable="optirun"
  cmdline="$VI_CORE_DIR/ImageGenerator/bin/vigcar $VI_CURRENT_SETUP/Config/ImageGenerator/AutoCfg.xml -m 0x01"
  ...
>
...
</Process>
```

Only attributes **path**, **executable** and **cmdline** should be changed. The path to 'optirun' could vary on different machines.

### Deploy Components on Multiple Hosts

SimServer is able to manage components (processes) on remote machines. Before configuring SimServer, users ought to make sure a SSH connection is well configured on local and remote machines. For the time being, only **public-key** for the authentication type of SSH is supported by SimServer. In another word, please make sure you can log on the remote machine with a specific user without a password.

Two IGs running on two computers could be configured in simServer.xml as following:

```
<Host>
  <Process
    group="igGroup"
    name="igCtr"
    auto="false"
    explicitLoad="false"
    path="$VI_CORE_DIR/ImageGenerator/bin"
    executable="vigcar"
    cmdline="$VI_CURRENT_SETUP/Config/ImageGenerator/AutoCfg.xml notrigger"
    useXterm="true"
    xtermOptions="-fg Green -bg Black -geometry 80x10+508+0"
    affinitymask="0xFF"
    schedPolicy="SCHED_RR"
    schedPriority="20"
    workDir="$VI_CURRENT_SETUP/Bin">
    <EnvVar name="LD_LIBRARY_PATH" val="$VI_CORE_DIR/ImageGenerator/bin:$LD_LIBRARY_PATH" />
  </Process>
</Host>

<Host name="tintin" vtdRoot="/home/vtd/VTD.2.0" username="vtd">
  <Process
    group="igGroup"
    name="igRemote"
    auto="false"
    explicitLoad="false"
    path="$VI_CORE_DIR/ImageGenerator/bin"
    executable="vigcar"
    cmdline="$VI_CURRENT_SETUP/Config/ImageGenerator/AutoCfg.xml notrigger"
    useXterm="true"
    xtermOptions="-fg Green -bg Black -geometry 80x10+508+0"
    affinitymask="0xFF"
    schedPolicy="SCHED_RR"
    schedPriority="20"
    workDir="$VI_CURRENT_SETUP/Bin">
    <EnvVar name="LD_LIBRARY_PATH" val="$VI_CORE_DIR/ImageGenerator/bin:$LD_LIBRARY_PATH" />
  </Process>
</Host>
```

, in <Host/> 'name', 'vtdRoot' and 'username' should be properly set. Please refer to Format of SimServer's Config file for more information.

More IGs could be configured in the same way, just add another <Host/> with a IG of <Process/> in it.

## Start Multiple VTD instances

VTD instances on one machine are determined by a collection of TCP/UDP ports, which are defined in SimServer's config file (mostly simServer.xml). In order to run another VTD instance on the same machine, users have to make sure those ports are exclusive to other VTD instances. Here are the general steps.

### 1. Copy a Setup

We recommend that you start by recursively copying the setup **Standard** to **DualSim1** and **DualSim2**:

- cp -pR Standard DualSim1
- cp -pR Standard DualSim2

Now go into each setups Bin/IGLinks directory and correct the Setup link:

#### DualSim1:

```
lrwxrwxrwx 1 marius vires 27 Sep 28 17:39 Distro -> ../../../../Distros/Current
lrwxrwxrwx 1 marius vires 28 Sep 28 17:39 Project -> ../../../../Projects/Current
lrwxrwxrwx 1 marius vires 17 Feb 28 11:25 Setup -> ../../../../DualSim1
lrwxrwxrwx 1 marius vires 42 Sep 28 17:39 Vig -> ../../../../Runtime/Core/ImageGenerator
```

#### DualSim2:

```
lrwxrwxrwx 1 marius vires 27 Sep 28 17:39 Distro -> ../../../../Distros/Current
lrwxrwxrwx 1 marius vires 28 Sep 28 17:39 Project -> ../../../../Projects/Current
lrwxrwxrwx 1 marius vires 17 Feb 28 11:25 Setup -> ../../../../DualSim1
lrwxrwxrwx 1 marius vires 42 Sep 28 17:39 Vig -> ../../../../Runtime/Core/ImageGenerator
```

**Note:** using the Current link for the setups does not work because each instance will have to work with a dedicated current setup.

### 2. Change the collection of ports in SimServer's config file

There are three pieces of configuration:

Piece 1: **Element <SimServer>**, **comPort** must be exclusive, you might want to change **logName** too.

#### DualSim1:

```
<SimServer name="Standard" comPort="32512" logName="taskRec_SimServer1.txt">
```

#### DualSim2:

```
<SimServer name="Standard" comPort="33512" logName="taskRec_SimServer2.txt">
```

Piece 2: **Environment variables**, all ports below should be exclusive

#### DualSim1:

```
<EnvVar name="PORT_TC_2_TRAFFIC" val="50611" />
<EnvVar name="PORT_TC_2_IG" val="50612" />
<EnvVar name="PORT_IG_2_TC" val="50613" />
<EnvVar name="PORT_TC_2_SCVIS" val="50615" />
<EnvVar name="PORT_SCVIS_2_TC" val="50616" />
<EnvVar name="PORT_TC_2_RDB" val="48190" />
<EnvVar name="PORT_TC_2_PARAMSERVER" val="54345" />
<EnvVar name="TRAFFIC_VIS_PORT_TC2IG" val="50612" />
<EnvVar name="TRAFFIC_VIS_PORT_IG2TC" val="50613" />
<EnvVar name="PORT_IG_CTRL" val="13112" />
<EnvVar name="PORT_IG_IMG" val="13110" />
<EnvVar name="PORT_VTGUI" val="48179" />
<EnvVar name="PORT_SCP" val="48179" />
<EnvVar name="PORT_TC_2_SCP" val="48179" />
<EnvVar name="PORT_TC_2_SIMSERVER" val="32512" />
```

#### DualSim2:

```
<EnvVar name="PORT_TC_2_TRAFFIC" val="51611" />
<EnvVar name="PORT_TC_2_IG" val="51612" />
<EnvVar name="PORT_IG_2_TC" val="51613" />
<EnvVar name="PORT_TC_2_SCVIS" val="51615" />
<EnvVar name="PORT_SCVIS_2_TC" val="51616" />
<EnvVar name="PORT_TC_2_RDB" val="49190" />
<EnvVar name="PORT_TC_2_PARAMSERVER" val="55345" />
<EnvVar name="TRAFFIC_VIS_PORT_TC2IG" val="51612" />
<EnvVar name="TRAFFIC_VIS_PORT_IG2TC" val="51613" />
<EnvVar name="PORT_IG_CTRL" val="14112" />
<EnvVar name="PORT_IG_IMG" val="14110" />
<EnvVar name="PORT_VTGUI" val="49179" />
```

```
<EnvVar name="PORT_SCP" val="49179" />
<EnvVar name="PORT_TC_2_SCP" val="49179" />
<EnvVar name="PORT_TC_2_SIMSERVER" val="33512" />
```

Piece 3: **Element <Host>**, log file for slaves should be exclusive too.

DualSim1:

```
<Host logName="taskRec_SimServerSlave1.txt">
```

DualSim2:

```
<Host logName="taskRec_SimServerSlave2.txt">
```

3. Image Generator Configuration

The image generator is not yet configured via the ParamServer. Therefore, you will have to adjust each image generator instance's communication settings within its respective setup. For this purpose, open the file Data/Setups/[DualSim1|DualSim2]/Config/ImageGenerator/IGbase.xml and set the ports in the same way you did it in Data/Setups/[DualSim1|DualSim2]/Config/SimServer/simServer.xml, e.g. (for **DualSim2**):

```
<TAKATA name="TAKATA"
:
taskControlServerPort="14112"
:
imageTransferServerPort="14110"
:
trigger="TCP">
:
</TAKATA>
```

Also, make sure that the IG configuration does not take place via the *Current* link within the Setups directory. Therefore, edit the file Data/Setups/[DualSim1|DualSim2]/Config/ImageGenerator/AutoCfg.xml and make sure to replace the line

```
<IGconfig>
<Includes>
:
<Include file="IGLinks/Distro/Config/ImageGenerator/IGConfig.xml" />
:
</Includes>
</IGconfig>
```

with

```
<IGconfig>
<Includes>
:
<Include file="IGLinks/Setup/Config/ImageGenerator/IGbase.xml" isOptional="0" />
<Include file="IGLinks/Project/Config/ImageGenerator/ProjectIGConfig.xml" isOptional="1" />
:
</Includes>
</IGconfig>
```

4. Ready-to-go Example

The ready-to-go example for operating two simultaneous instances of VTD on the same computer is contained in the following archive:

[vtd.2.0.3.addOns.DualSim.20161223.tgz](#)

Interfaces

Only commands in this section matter to communicate with SimServer. Note that all SCP commands should be inside of <SimServer/> element and all attributes in the examples are mandatory unless noted 'optional'.

For the following SCP commands, if users meant to apply a command to the host where the SimServer Master is running they can use 'localhost' simply.

- **Load:** Load components on hosts. Users can specify which exactly component on which host to be loaded by 'host' and 'component'. Note that component flagged by 'explicitLoad' will not be loaded by <Load/>, it has to be loaded by specifying host and component, like <Load host="ray" component="ScenarioEditor"/>

```
<Load host="vtdhost" component="ScenarioEditor" cmdlineTail="trafficScenario.xml"/>
```

Attribute	Description	Value	Default	Appearance	Note
-----------	-------------	-------	---------	------------	------

host	host name	string	empty string	optional	if empty string, command will be applied on all components on all hosts. Maybe not needed in the future
component	component name	string	empty string	optional	if this is changed then TaskControl has to change it too
group	name of a group	string	empty string	optional	by which command Load/Unload/Reload will be applied on multiple components belonging to the group
cmdline	replace the command line of a component	string	empty string	optional	blank needed inter-options
cmdlineTail	command line extent	string	empty string	optional	instead of replacing the command line in simServer.xml 'cmdlineTail' will be added back to original's command line

- **Unload:** Unload components on hosts. Users can specify which exactly component on which host to be loaded by 'host' and 'component'. Note that component flagged by 'persistent' (in simServer.xml) will not be unloaded by <Unload/>, it has to be unloaded by specifying host and component or persistent could be used like <Unload persistent="true"/>. Note that if 'host' and 'component' is specified all flags of a component such as 'persistent' and 'detached' will be ignored. So is when 'group' is specified.

```
<Unload host="vtdhost" persistent="true"/>
```

Attribute	Description	Value	Default	Appearance	Note
host	host name	string	empty string	optional	if empty string, command will be applied on all components on all hosts. Maybe not needed in the future
component	component name	string	empty string	optional	if this is changed then TaskControl has to change it too
group	name of a group	string	empty string	optional	by which command Load/Unload/Reload will be applied on multiple components belonging to the group
persistent	unload persistent components even without its name	true or false	false	optional	
detached	unload detached components even without its name	true or false	false	optional	

- **Reload:** Reload components on hosts. Users can specify which exactly component on which host to be loaded by 'host' and 'component'. Act ea <Unload/> and then <Reload/>.

```
<Reload host="vtdhost" group="igGroup"/>
```

Attribute	Description	Value	Default	Appearance	Note
host	host name	string	empty string	optional	if empty string, command will be applied on all components on all hosts. Maybe not needed in the future
component	component name	string	empty string	optional	if this is changed then TaskControl has to change it too
group	name of a group	string	empty string	optional	by which command Load/Unload/Reload will be applied on multiple components belonging to the group
cmdline	replace the command line of a component	string	empty string	optional	blank needed inter-options
cmdlineTail	command line extent	string	empty string	optional	instead of replacing the command line in simServer.xml 'cmdlineTail' will be added back to original's command line

- **Terminate:** Terminate all SimServers as well as all components, except for detached components.

```
<Terminate host="vtdhost"/>
```

Attribute	Description	Value	Default	Appearance	Note
host	terminate SimServer on a dedicated host	string	empty string	optional	if empty string, command will be applied on all components on all hosts.