

Installing Vivado and using Vivado remotely

- # Vivado Linux vs Windows
- Vivado supports multiple OS
 - Interestingly Linux Vivado is generally faster than Windows Vivado.
 - Example: Windows 3h vs Linux 1h

Notes, Installation, and Li... UG973 2024-05-30 2024.1 English

Requirements and Setup

Supported Operating Systems

AMD supports the following operating systems on x86 and x86-64 processor architectures.

- Microsoft Windows Professional/Enterprise 10.0 22H2 Update
- Microsoft Windows 11.0 22H2 Update; 11.0 23H2 Update
- Red Hat Enterprise Workstation/Server 7.4, 7.5, 7.6, 7.7, 7.9, 8.5, 8.6, 8.7, 8.8, 8.9, 9.0, 9.1, 9.2, and 9.3 (64-bit), English
- CentOS 7.4, 7.5, 7.6, 7.7, and 7.9 (64-bit), English
- SUSE Linux Enterprise 12 SP5, 15 SP3, and 15 SP4 (64-bit), English
- Amazon Linux 2 AL2 LTS (64-bit)
- AlmaLinux 8.7 and 9.1 (64-bit)
- Ubuntu Linux 20.04.4 LTS; 20.04.5 LTS; 20.04.6 LTS; 22.04 LTS; 22.04.1 LTS; 22.04.2 and 22.04.3 LTS (64-bit), English

Vivado version and Linux version

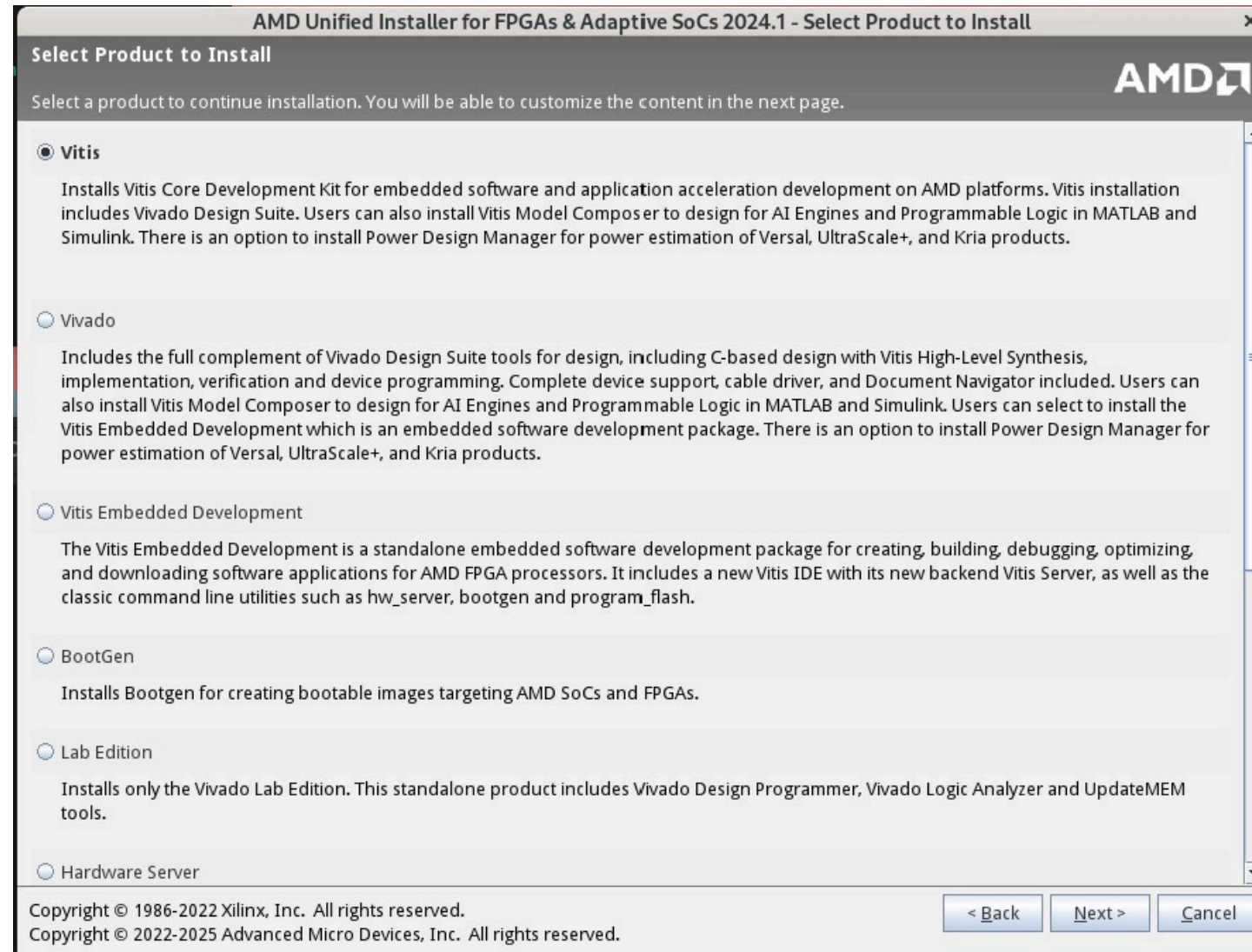
- Vivado 2024.1 is supported by HLS4ML
- Can use AlmaLinux 9.6 (which is a recent Linux version)
 - Although this OS version is not officially supported by AMD
 - Vivado 2024.1 supports up to Red Hat Linux 9.3
 - However AlmaLinux 9.6 seems to work

Installing Vivado 2024.1 on Linux

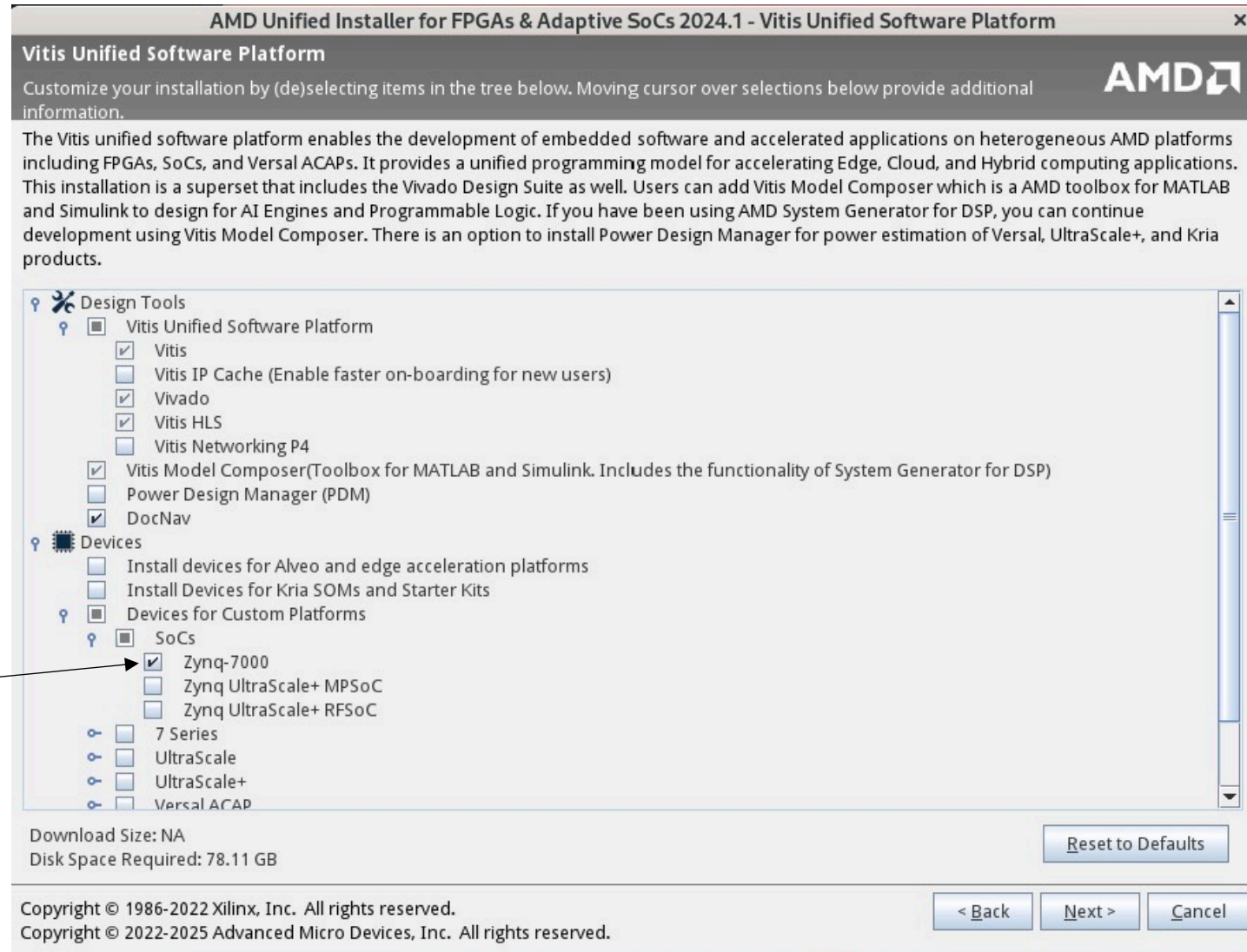
- There is free version of software (Vivado, Vitis, HLS, ...)
- Multi-step process:
 1. Download AMD “downloader”
 2. Get “Vivado installer” using AMD “downloader”
 3. Run “Vivado installer”

Vivado 2024.1 install options

Vitis option will
install Vivado
and HLS



Vivado 2024.1 install options

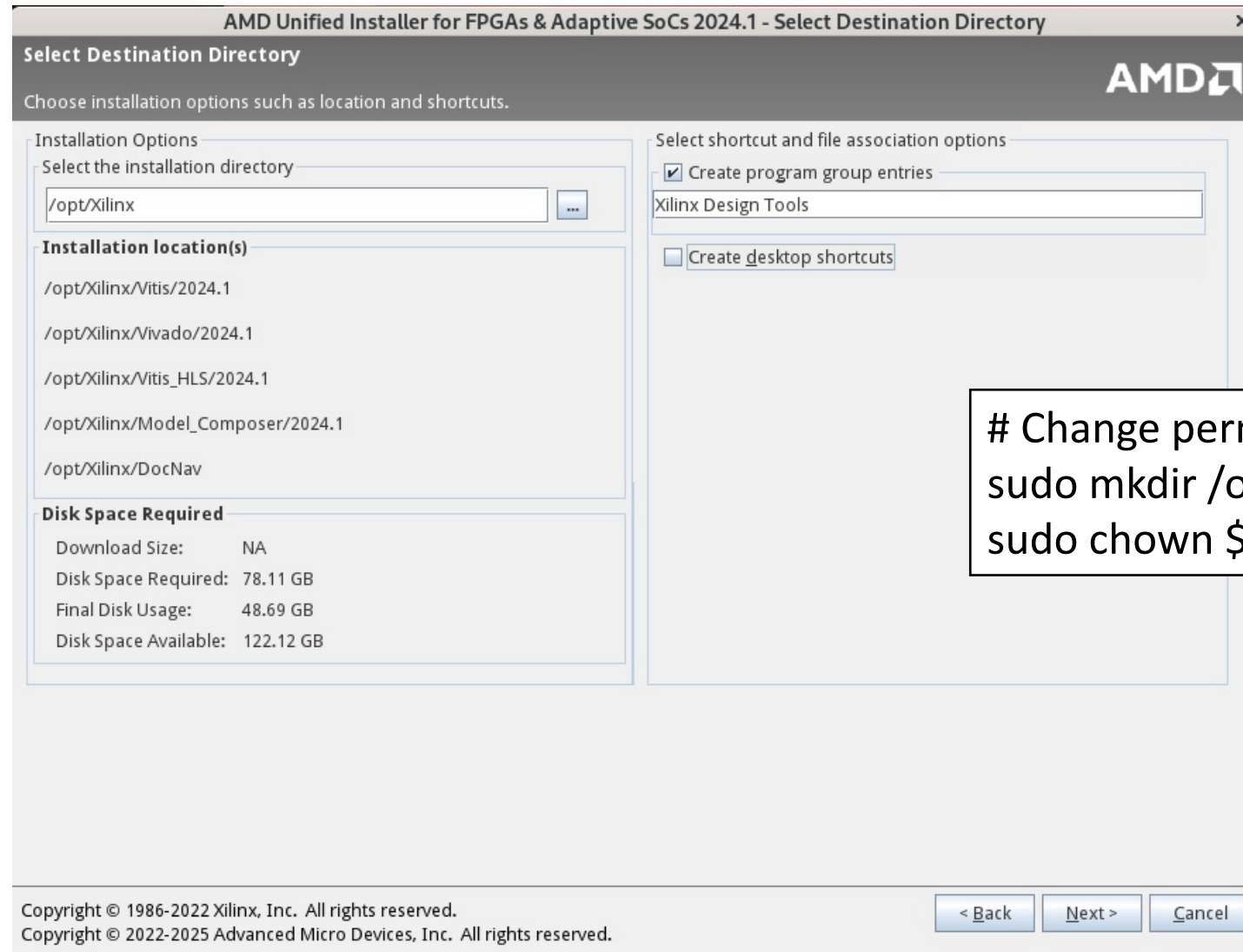


Just select Zynq-7000 to reduce disk space

Vivado 2024.1 install options

I generally install
in /opt/Xilinx

Application is
49 GB



```
# Change permission to allow to write
sudo mkdir /opt/Xilinx
sudo chown $USER /opt/Xilinx
```

Removing pesky Xilinx Information Center

- There is an annoying notification system from Xilinx
- Can remove it from starting up by below commands

```
cd ~/.config/autostart  
rm Xilinx\ Information\ Center.desktop
```

Installing Vivado drivers

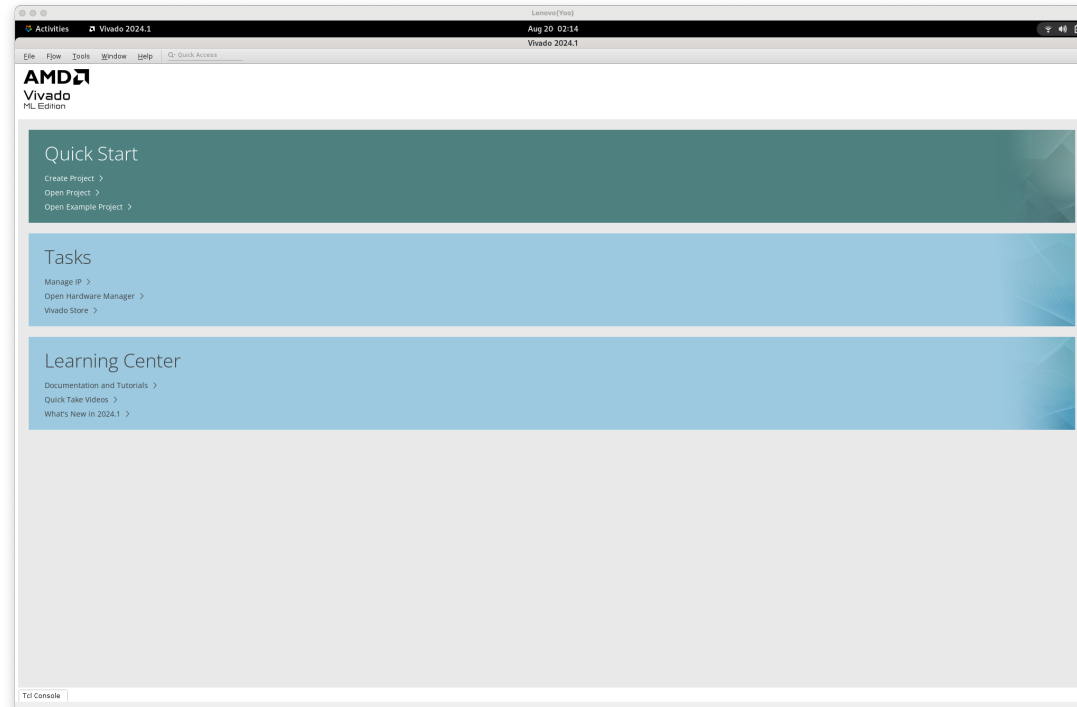
- Need to install Vivado drivers for the computer to talk to FPGA.

```
cd /opt/Xilinx/Vivado/2024.1/data/xicom/cable_drivers/lin64/install_script/install_drivers  
sudo ./install_drivers
```

Testing Vivado

- Can open up vivado with below command

```
source /opt/Xilinx/Vivado/2024.1/settings64.sh  
vivado #Creates log files in the directory you are running
```



Fixing Vitis GUI bug

- Vitis GUI has a bug with AlmaLinux 9/Redhat 9

```
# For easy debugging of vitis
cd /opt/Xilinx/Vitis/2024.1/bin
sed -i '/vitisng-ide/ s/ > \dev\//null 2>&1 \&$//' vitis
```

```
# Fix vitis bug
cd /opt/Xilinx/Vitis/2024.1/lib/lnx64.o/Rhel
mv libstdc++.so.6 libstdc++.so.6.old
ln -s /lib64/libstdc++.so.6
```

```
# Test vitis
cd ~
source /opt/Xilinx/Vitis/2024.1/settings64.sh
vitis
```

Remote Linux machine

- We can install Vivado on a remote Linux machine.
- How can we connect to Linux machine?
 - Obviously ssh, but we need a GUI for Vivado

Running Vivado on remote Linux machine

- How can we run Vivado?

- `source /opt/Xilinx/Vivado/2024.1/settings.sh`

- `vivado`

- If “ssh -X” is used, then Vivado could show on your computer using X11.

- Need to have Xserver(XQuartz) on your computer.

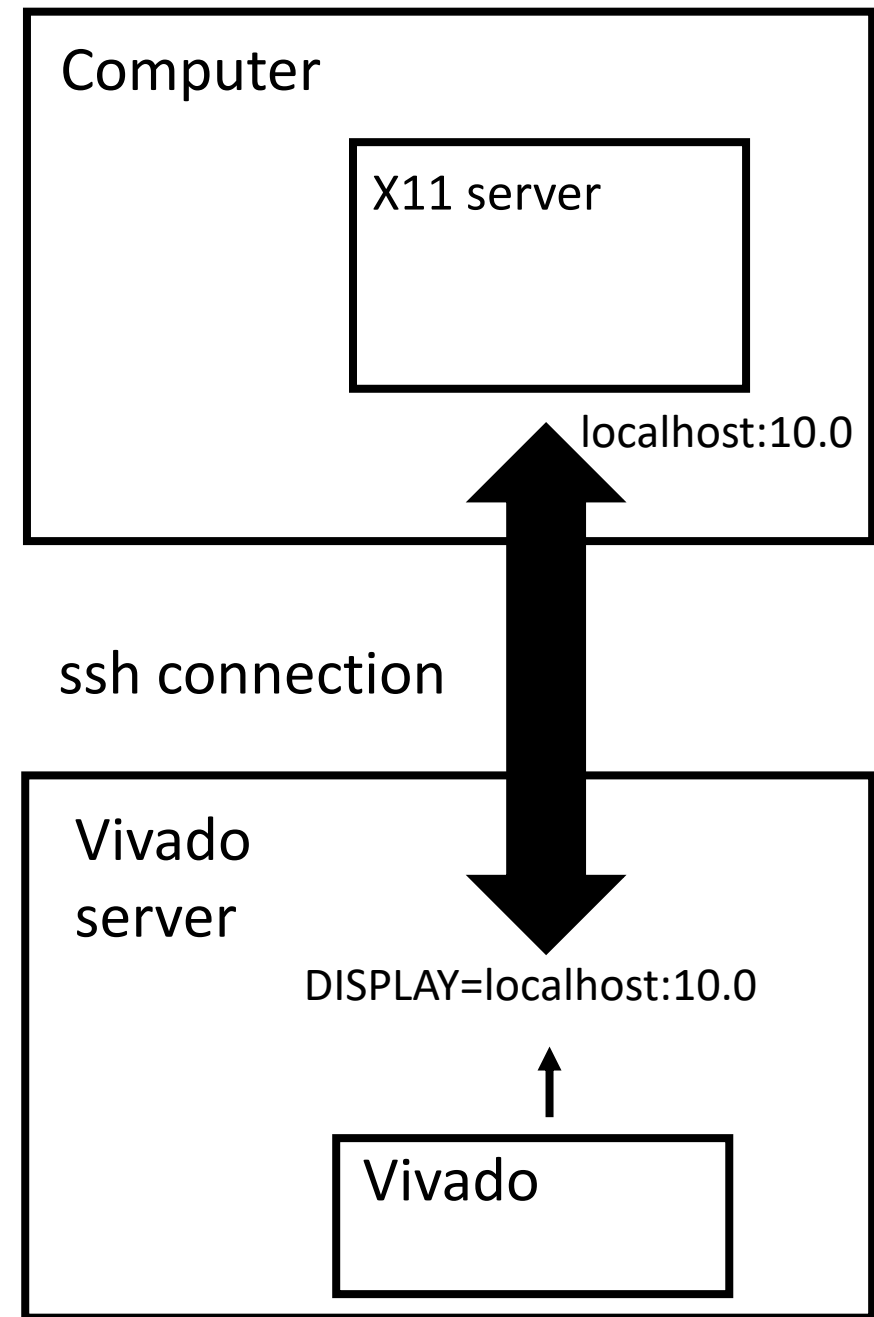
X11

- When connecting with "ssh -X", vivado server will have environment variable:

`DISPLAY=xx:yy`

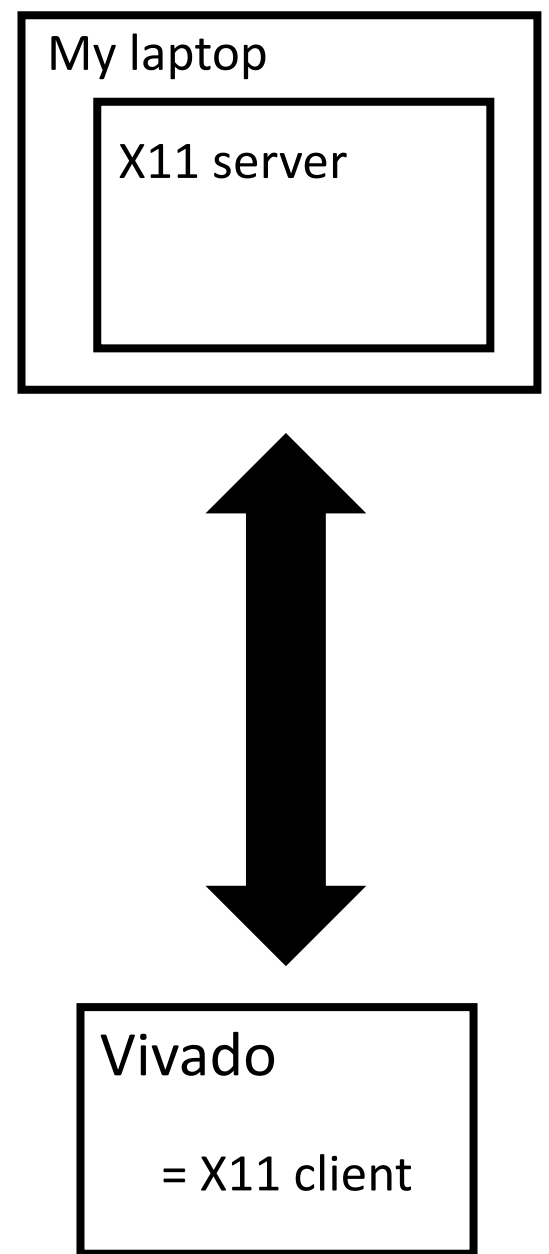
➤ `echo $DISPLAY`

- Can send any GUI by setting the `DISPLAY` variable.



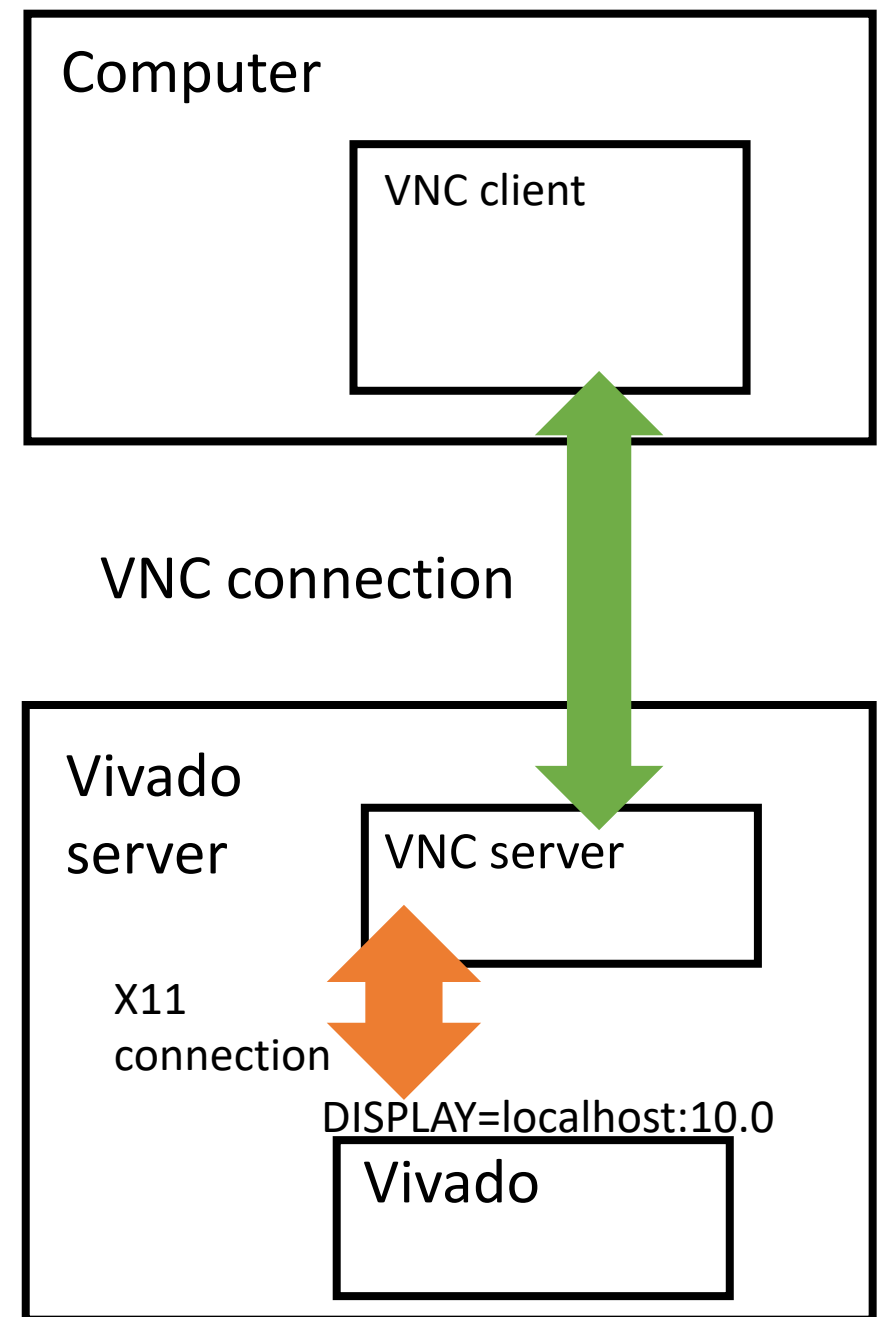
X11

- But X11 is very “chatty”. Needs to go back and forth many time for X11 server and X11 client (application)
- So if connection between X11 server and X11 client has even small latency, it gets amplified.



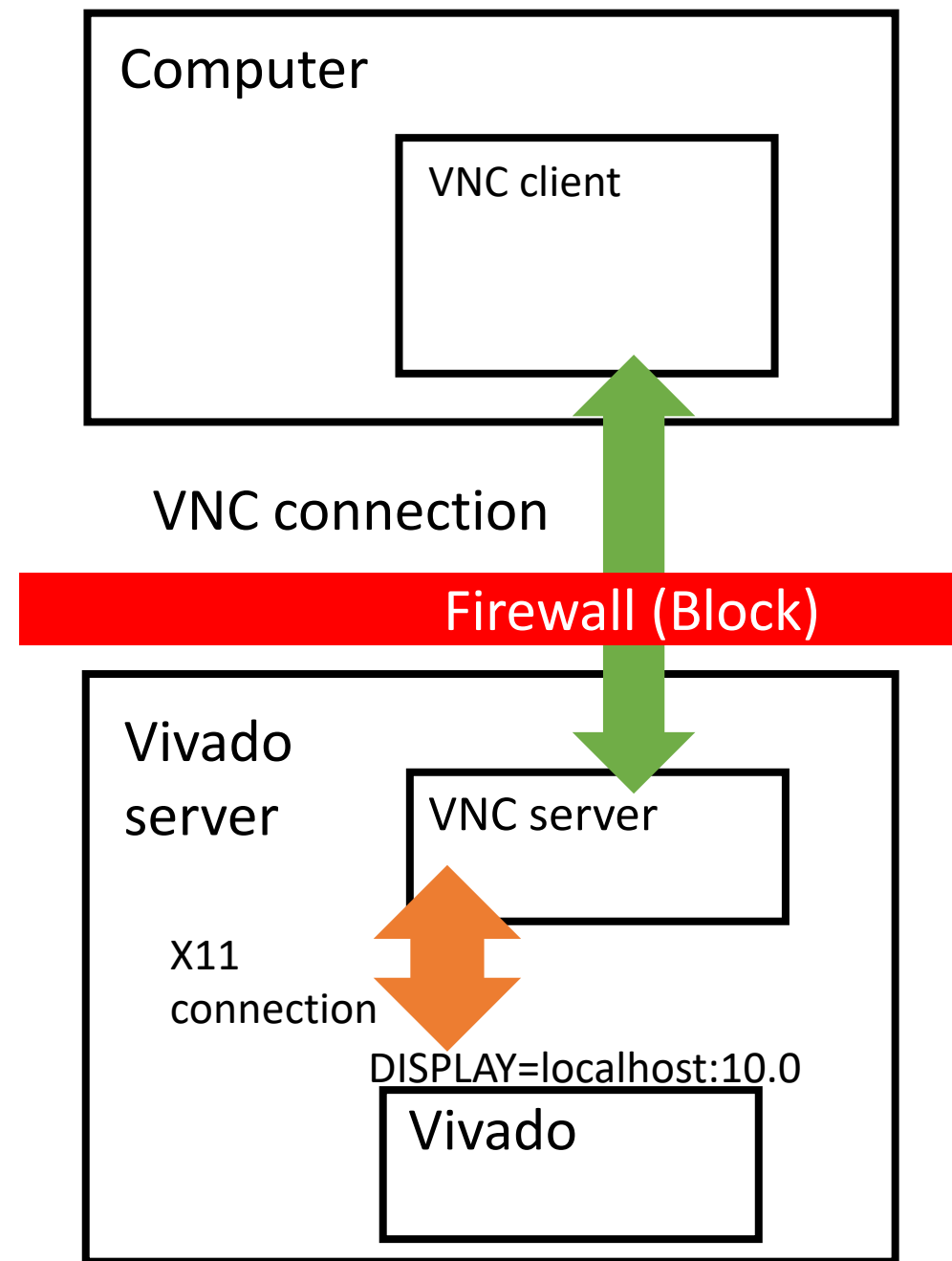
Using VNC

- We can instead use different program for remote display (VNC)
- Then Vivado uses **X11 with VNC** server. Our computer uses **VNC connection with VNC server**.



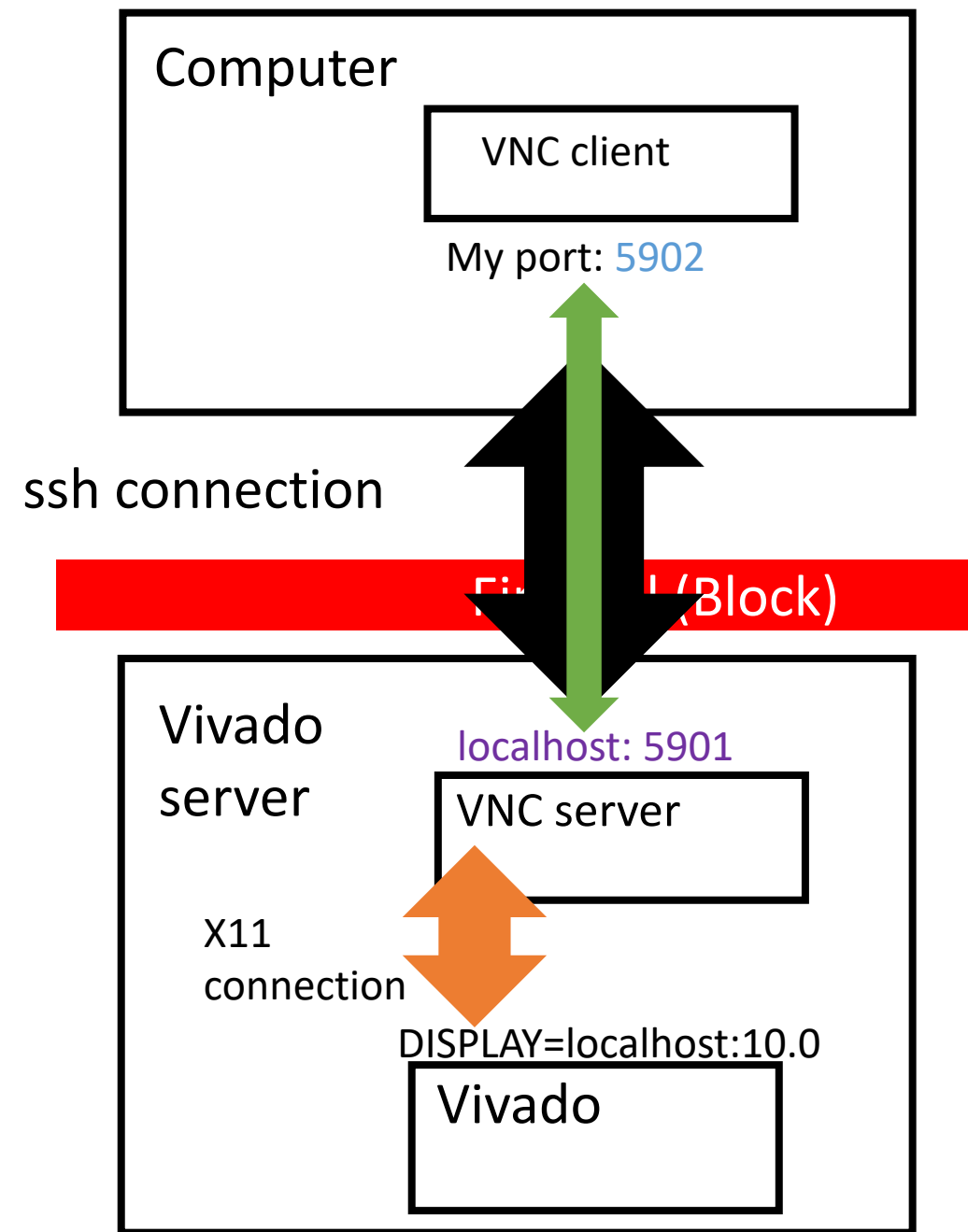
Firewalls

- VNC generally uses 59XX ports.
- But these ports are normally blocked by firewalls.
- Also VNC doesn't have encryption. Someone could intercept what you are typing!



ssh tunnel

- Through a ssh connection, we can make the VNC connection.
 - ssh is encrypted.
- On my computer
`ssh -L 5902:localhost:5901 vivado_server`



Sequence of commands for VNC

1. `@laptop: ssh -L 5902:localhost:5901 vivado_server`
2. `@vivado_server: vncserver`
 - vncserver will show a port like `:1 == 5901`
3. `@vivado_server: export DISPLAY=:1`
4. `@vivado_server: source ...settings.sh; vivado`
5. `@laptop: Use vnc client and connect to localhost:5902`

Remote Desktop Protocol

- Windows remote desktop protocol is becoming more popular on Linux. It is generally faster than VNC.
- Linux can have “xrdp” installed.
- From AlmaLinux 10, RDP is supported by default.
- Can connect to server with rdp clients.
 - Need to use ssh tunnels to pass firewalls. (rdp port: 3389)

Installing XRDP for AlmaLinux 9.6

```
sudo dnf update
# Get epel software repository
sudo dnf install epel-release
sudo dnf install xrdp
# Start xrdp
sudo systemctl enable --now xrdp
# Open firewall for xrdp
sudo firewall-cmd --permanent --add-port=3389/tcp
sudo firewall-cmd --reload

# Lower bpp to see Vivado well
sudo vi /etc/xrdp/xrdp.ini
# Change to: max_bpp=24
sudo systemctl restart xrdp
```

Sequence of commands for RDP

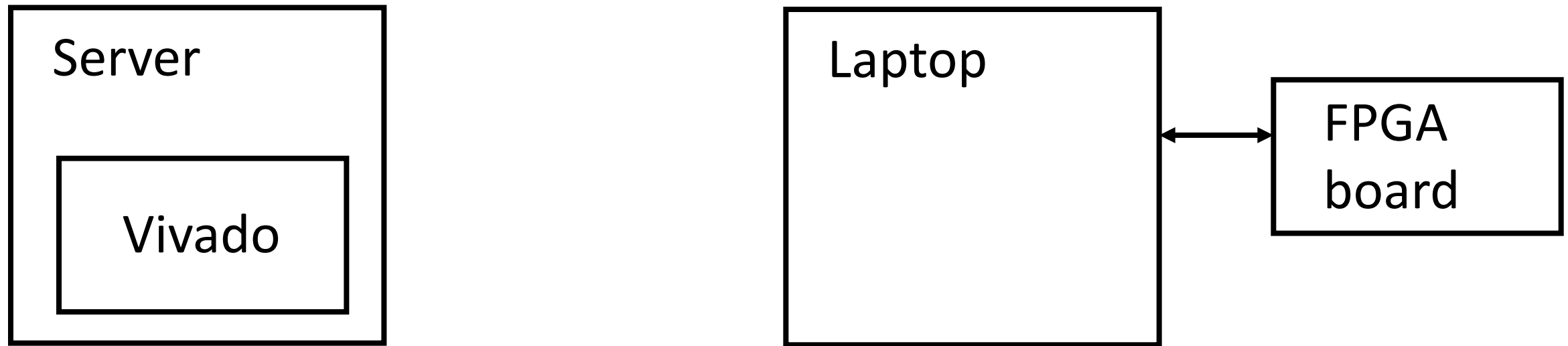
1. `@laptop: ssh -L 3389:localhost:3389 vivado_server`
2. `@vivado_server: export DISPLAY=:XX`
 - Find DISPLAY that “RDP server” is using.
 - ❖ `ps aux | grep $USER | grep Xvnc`
3. `@vivado_server: source ...settings.sh; vivado`
4. `@laptop: Use rdp client and connect to localhost:3389`

Mac remote desktop client (Windows)

- Need to setup connection file for Mac...
- After adding computer in remote desktop client (Windows), export the connection.
 - Will get FILENAME.rdp
- Change content in FILENAME.rdp to be as below
 - use redirection server name:i:1

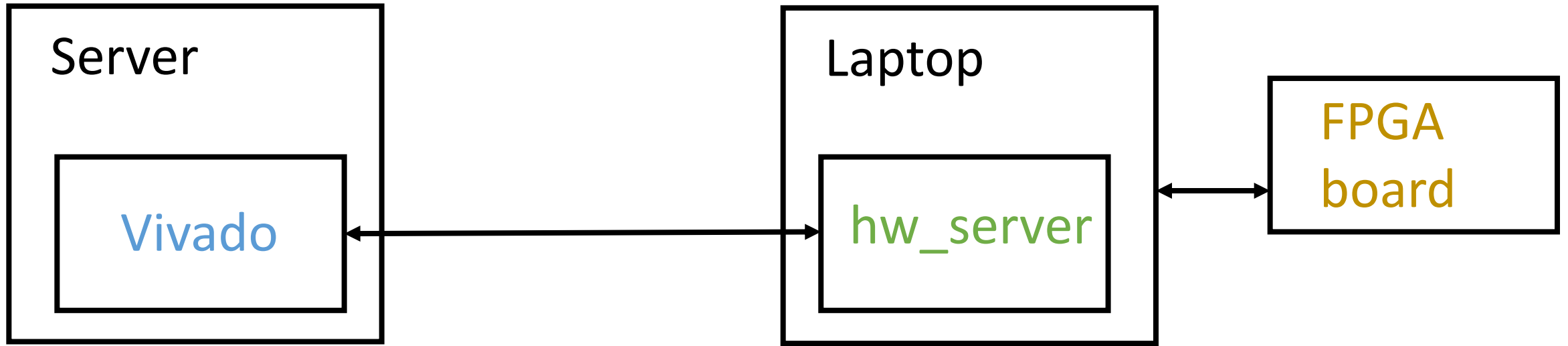
Using Vivado to connect to remote board

- One could use Vivado on a server, but have a FPGA board connected to the laptop.



- How to upload firmware and use ILA on Server Vivado?

Using Vivado to connect to remote board



```
hw_server -stcp::PORT_NUMBER
```

- Can open a **hw_server** on laptop, where **Vivado** connects to **hw_server** to use **FPGA board**.

- How much did you understand? www.kahoot.it