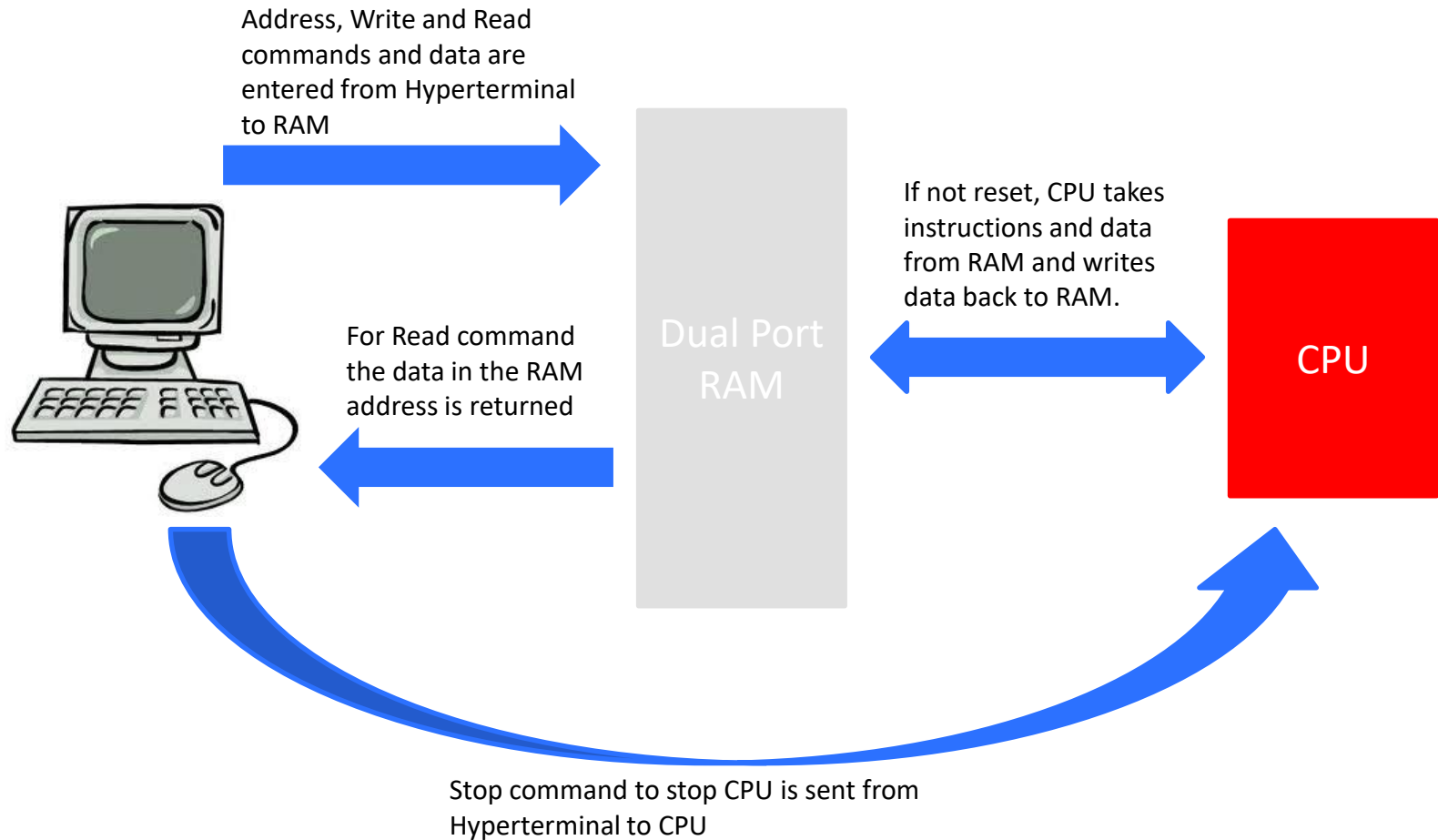
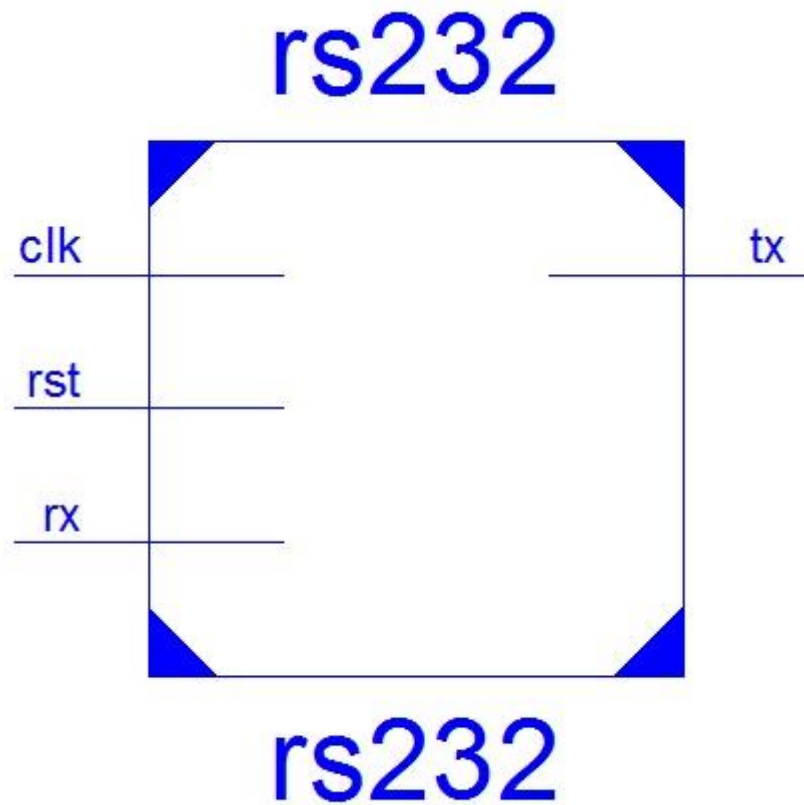


# VerySimpleCPU with RS232

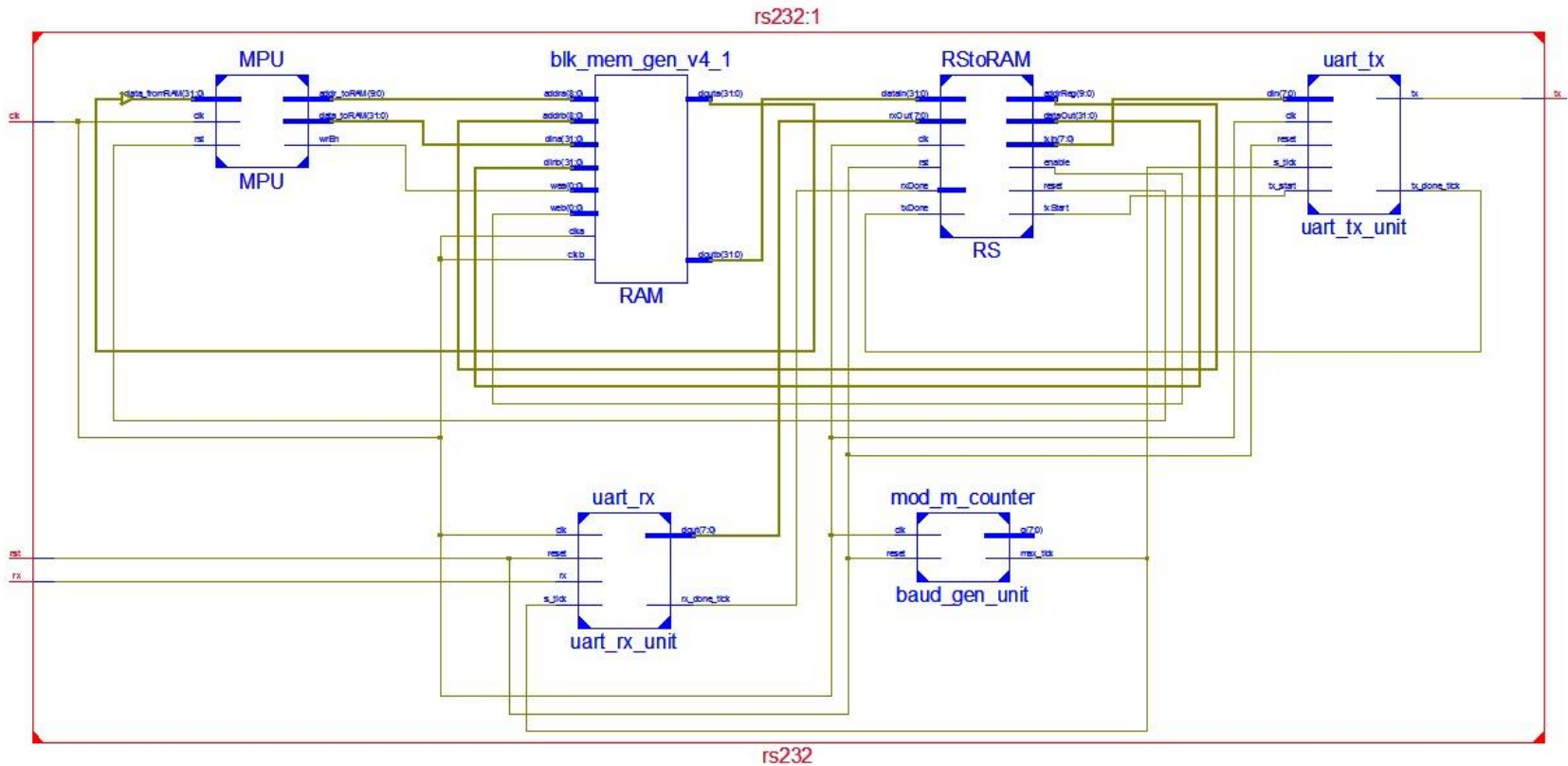
## Design Behavior:



Top Level:



## Design Submodules:



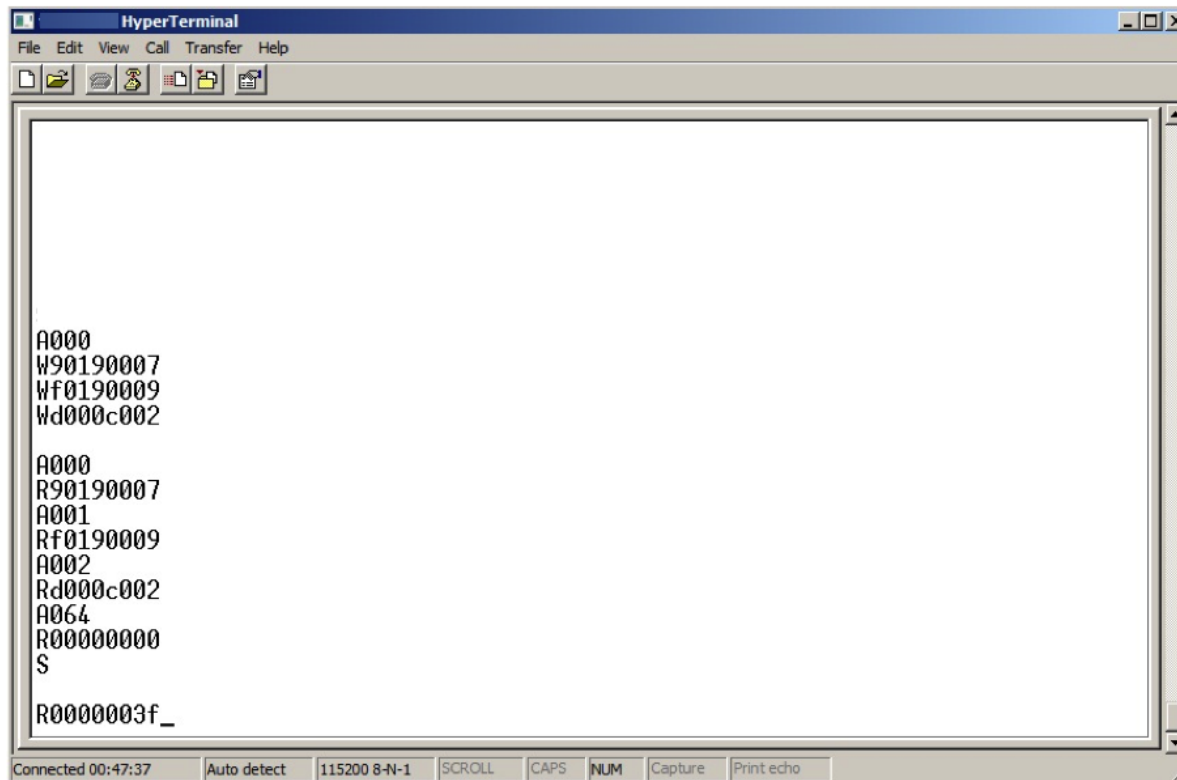
## Design Submodules:

- MPU is a VerySimpleCPU.
- RAM is a true dual-port RAM that has 2 ports.
- uart\_rx\_unit deserializes data received from RS232 port.
- uart\_tx\_unit serializes the data to be sent back to RS232 port.
- baud\_gen\_unit handles the sampling rate of the serial data sent to or received from RS232 port.
- RS is the port that translates the command sent from terminal to RAM and MPU.

## Communication Protocol:

The commands entered here:

- Sets address to 0
- Write instructions below to addresses 0, 1, 2
  - Writes number 7 to address 100
  - Multiplies 9 with the number in address 100 and writes the result back to 100
  - Loops on address 2
- Check the data on addresses 0, 1, 2, 100 (h064)
- Starts the CPU
- Reads the data on address 100 (h064) which is  $7 * 9 = 63$  (h3f)



```
HyperTerminal
File Edit View Call Transfer Help
[Icons]
A000
W90190007
Wf0190009
Wd000c002
A000
R90190007
A001
Rf0190009
A002
Rd000c002
A064
R00000000
S
R0000003f_
Connected 00:47:37 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
```

## Communication Protocol:

- There are four commands in total, that are **A**ddress, **W**rite, **R**ead and **S**tart/**S**top CPU. All commands are capital letters.
- All numbers should be entered in hex (0123456789 and abcdef lowercase).
- Address should be entered as three hex digits, even if it is not three digits long.
- Data should be entered in eight hex digits, even if it is not eight digits long.
- When data is entered to a memory address using **W**rite, new address location will be updated to 'address + 1' which will enable uninterrupted data writing.
- CPU can be stopped or started by using **S**tart/**S**top command. It is necessary to stop CPU while writing into RAM.
- **R**ead command reads the data in the current address.