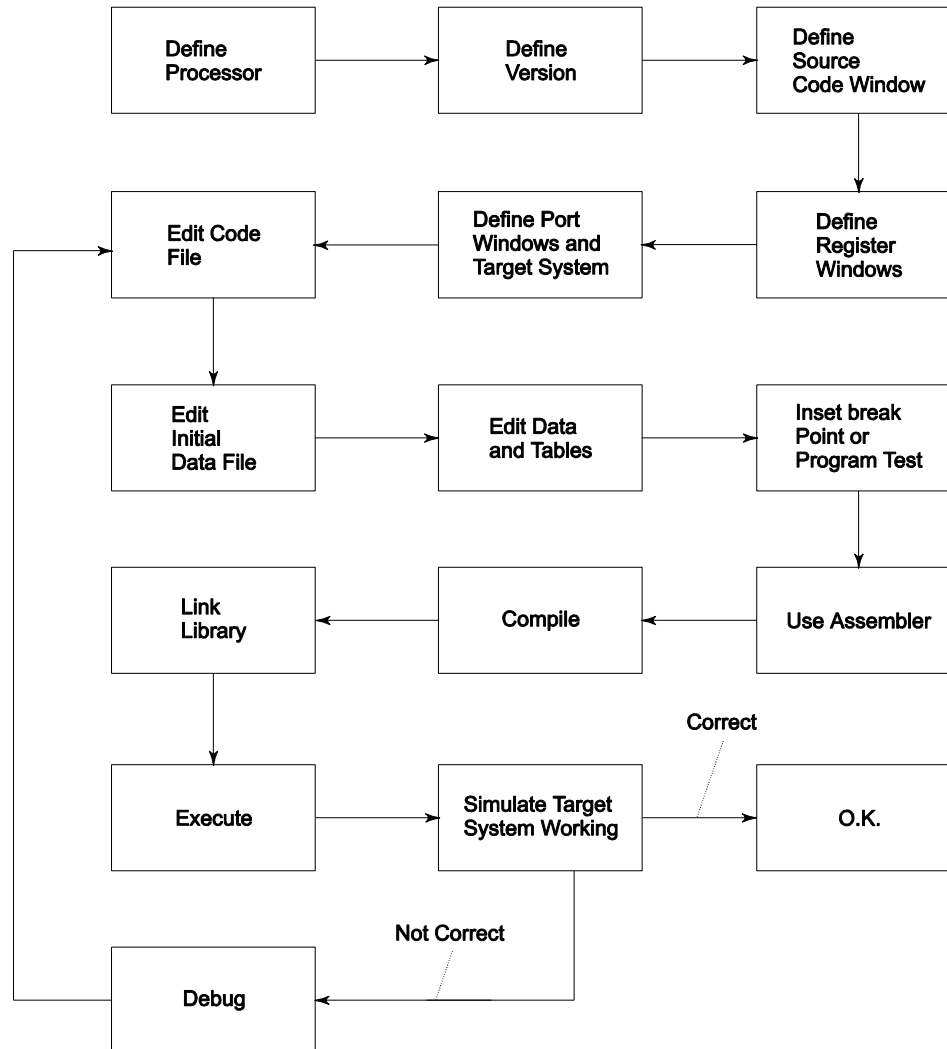


Testing, Simulation and Debugging Techniques and Tools:

Lesson-1

Integration And Testing of Embedded Hardware-Software on Host Machine

Design and development process for integrating software and hardware, and testing



Host and Target Test Systems During Development Process

- Two systems with different CPUs or microcontroller and hardware architecture.
- One system— host, generally PC or laptop or workstation.
- Other system —target, actual hardware for the embedded system under development

Host and Target

- Target independent and target dependent code.
- Code has two parts: hardware independent code and hardware dependent code.
- Port and devices— have fixed addresses on hardware

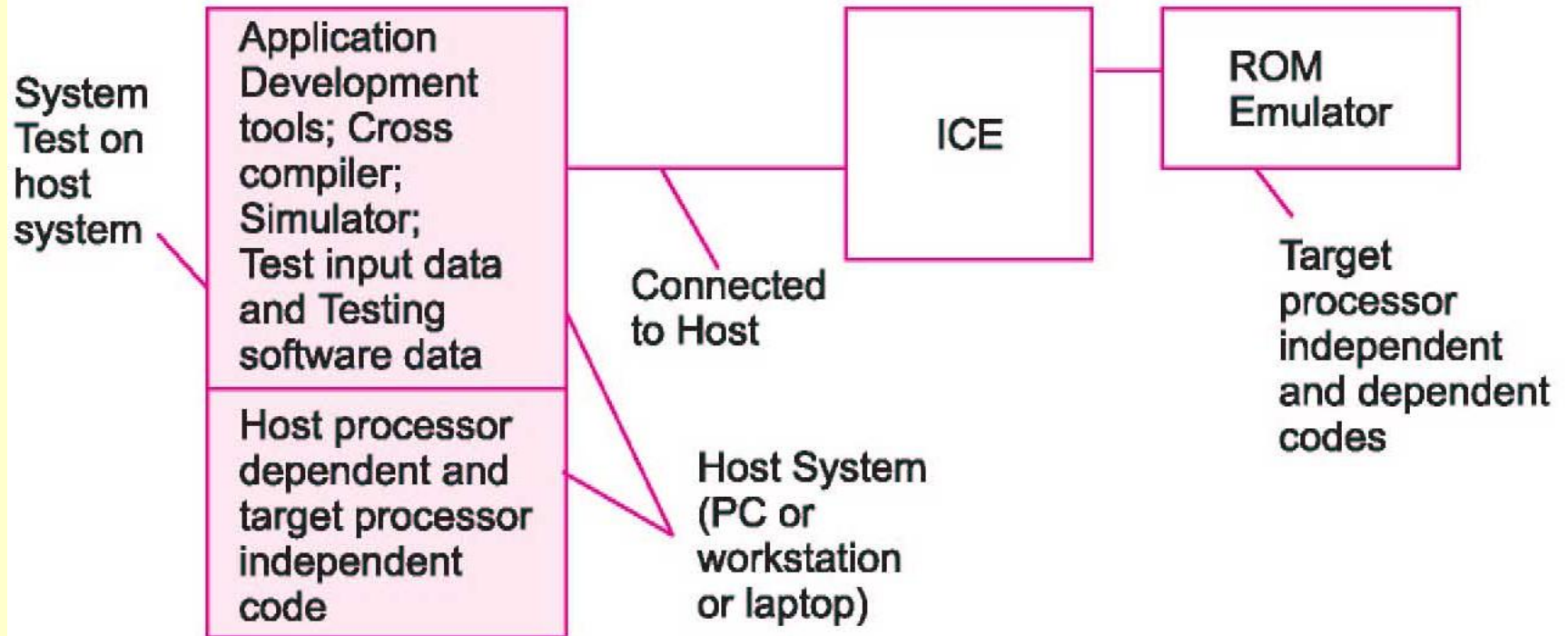
Host

- Testing and debugging at each stage as well as at the final stage when the modules are put together.
- Test at initial stages— at the host
- Host— used to test hardware independent codes.
- Host — also used to run simulator

Target

- Used to test hardware independent codes.
- Target — also used to run monitor

Host and Target Test Systems During Development Process



Embedded Hardware Tests

- Target Hardware Debugging
- Testing of Processor
- Testing of External Peripherals
- Testing of Memory and Flash Memory
- Processor- External Peripherals, Types of Memory- Memory Testing- Flash Memory

Embedded Software Tests

- Testing codes for the GUIs, and HCIs
- Testing the codes for the tasks
- Testing of codes for decision blocks in the tasks
- Testing of codes for the loops
- Testing of codes for display
- Testing of codes for communication to other computing systems

Testing Steps at Host Machine

- 1. Initial Tests— each module or segment at initial stage itself and on host itself
- 2. Test data— all possible combinations of data designed and taken as test data
- 3. Exception condition tests — all possible exceptions for the test

Testing Steps at Host Machine...

- 4. Tests-1: hardware independent code
- 5. Tests-2:scaffold software, software running on host the target dependent codes and which have same start of code and port and device addresses as at the hardware.
- Instructions– given from file or keyboard inputs.
- Outputs–at host's LCD display and saves at file

Testing Steps at Host Machine...

- 6. Test Interrupt Service routines hardware independent part— sections of interrupt service routines are called, which are hardware independent and tested
- 7. Test Interrupt Service routines hardware dependent part

Testing Steps at Host Machine...

- 8. Timer tests— Hardware dependent code timing functions, clock tick set, counts get, counts put, delay
- 9. *Assert*-Macro tests— insert the codes in the program that check whether a condition or a parameter actually turns true or false.
- If it turns false— the program stops.
- Use the assert macro at different critical places in the application program

Summary

We learnt

- System codes tested on the host system
- Host system has application development tools, large memory and windows or powerful GUIs.

We learnt

- Each module tested at initial stage of its development as well as by integrating all modules.
- Steps for hardware (target) independent and dependent code software testing on host machine.

Integration And Testing of Embedded Hardware-Software on Host Machine