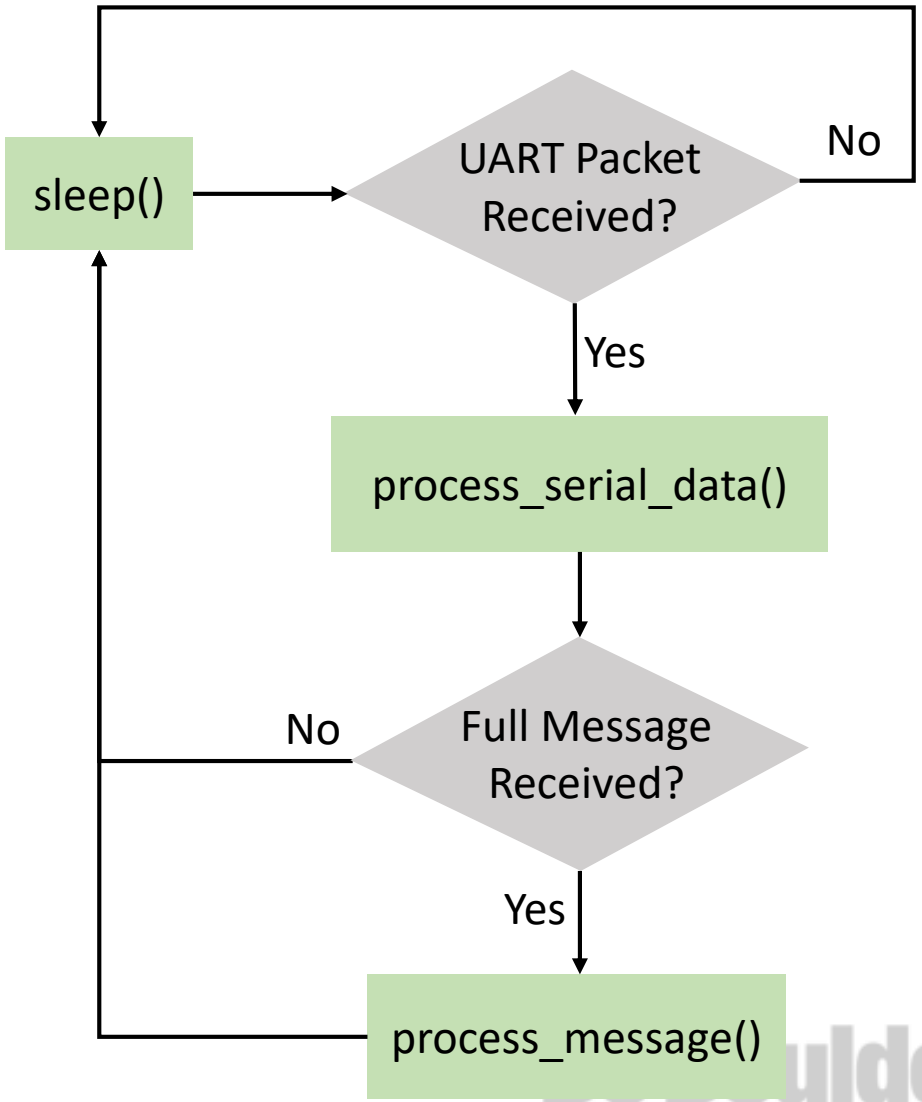
Embedded Software Essentials

Embedded Software Engineering

C1 M1 V3

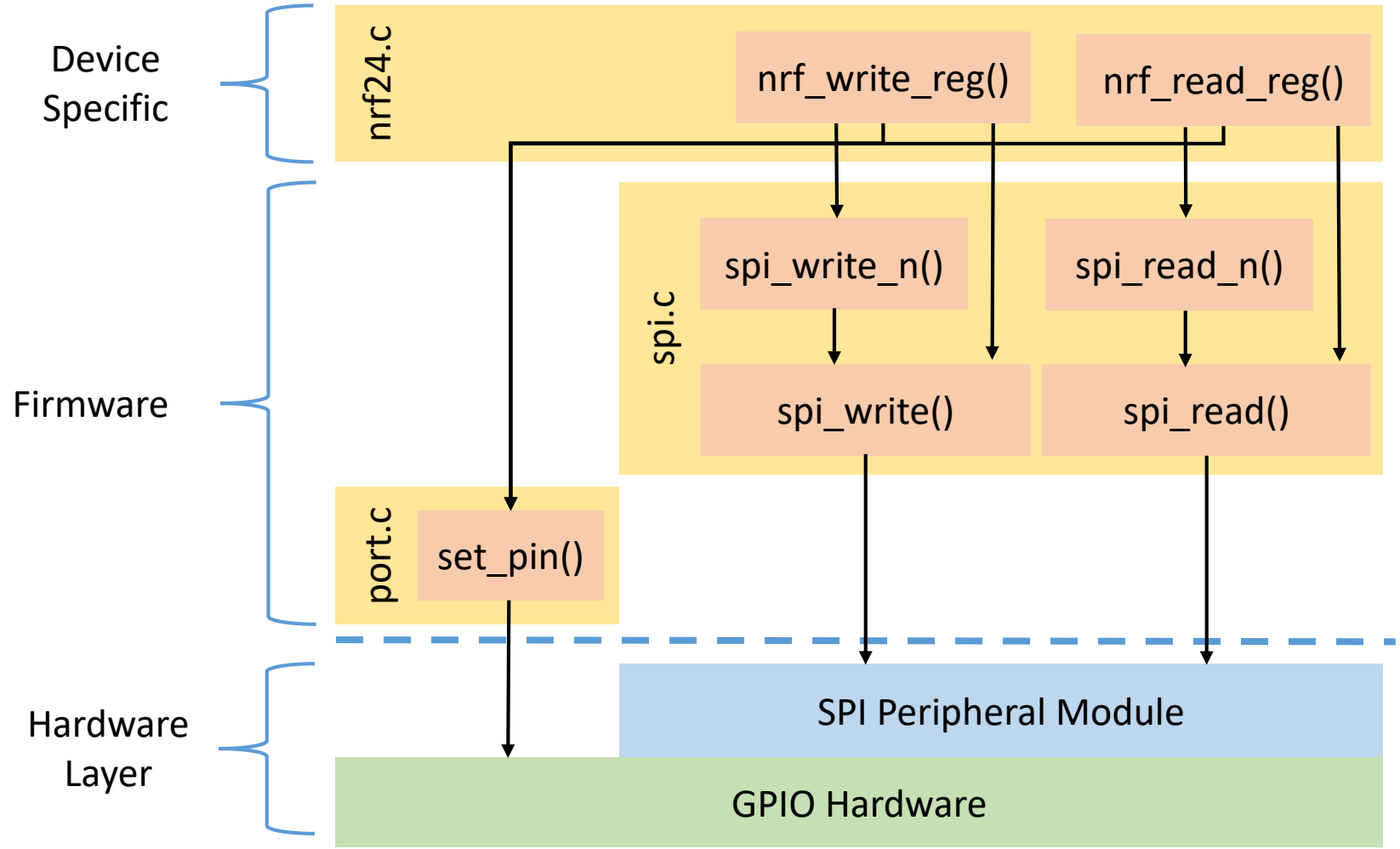
Flow Diagram

- Algorithm Based
- Shows functional behavior
- Conditional Decisions
- High Level Function Calls



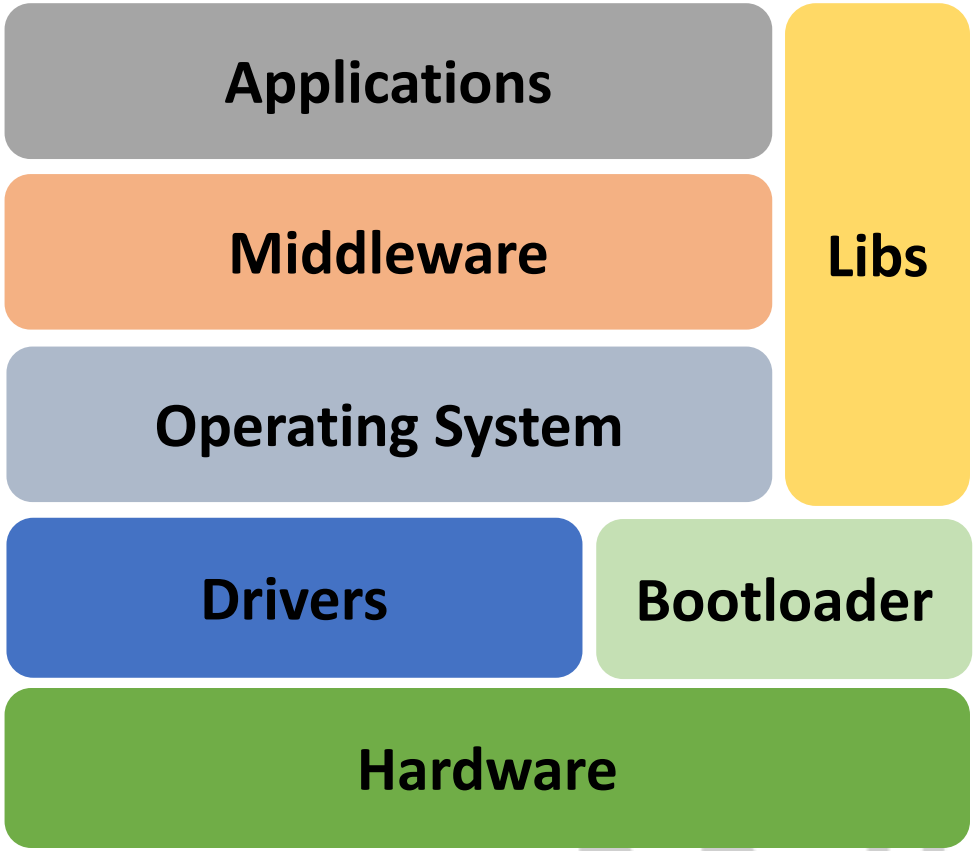
Software Block Diagram

- C-Files are “modules”
- Many definitions
- Functions interact with other modules
- Eventually interact with Hardware



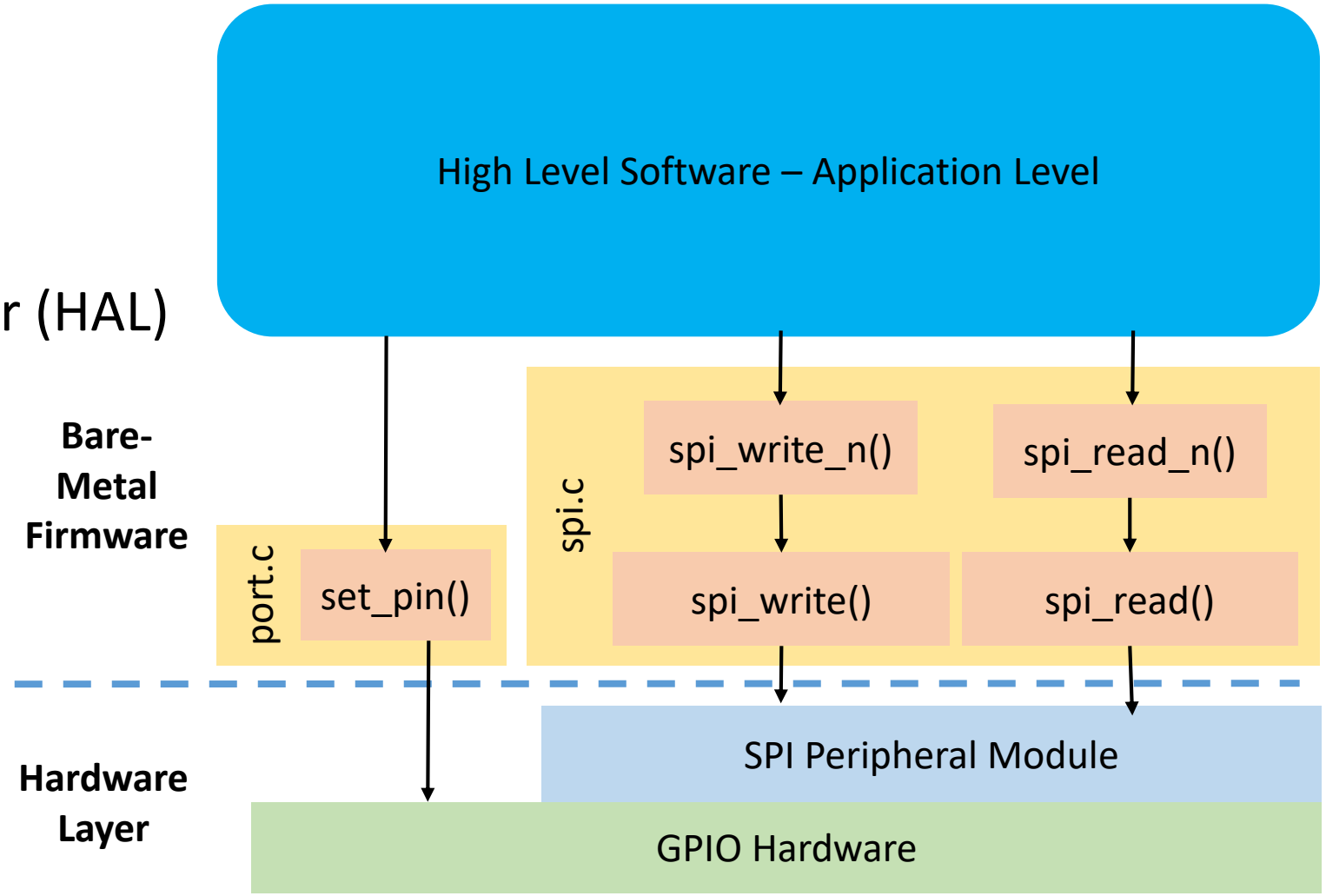
Software in Layers

- Device Drivers
  - Interface to hardware layers
  - HAL – Hardware Abstraction Layer
- Code Booting
- Operation System (OS)
  - Abstracts High from Low levels
  - Scheduling
  - Resource management
- Libraries for shared code

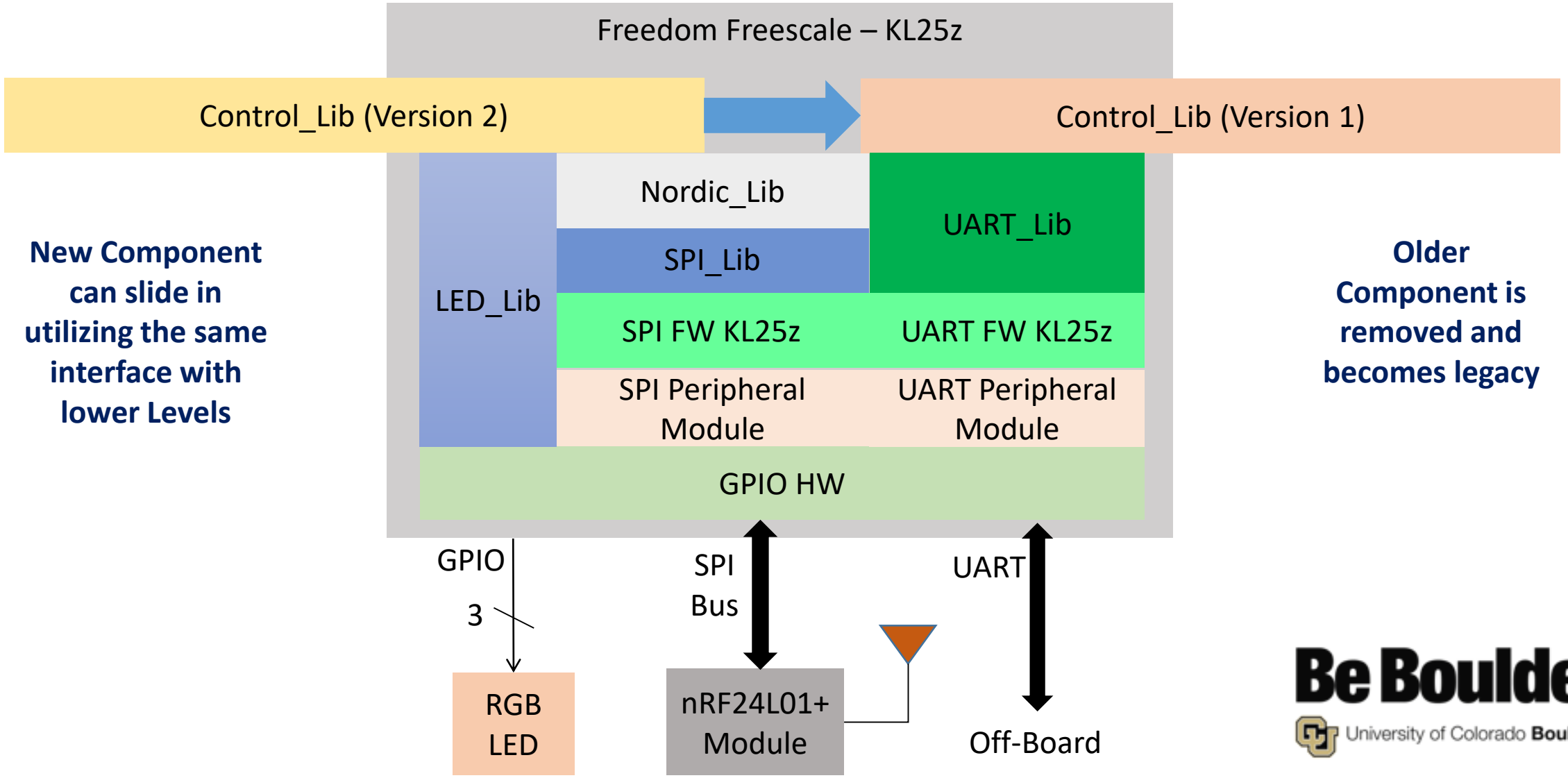


Hardware Abstraction

- Bare-Metal Firmware (FW)
  - Low Level Control
- Hardware Abstraction Layer (HAL)
- Platform Independence
- Portable Interface



Software Components



Software Engineer Tools

- Simulators
- Emulators
- Compilers
- Installers
- Debuggers

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Require a host system and software applications to run these tools

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Might be combined into a Single Hardware Solution

Programmer/Debuggers

Principles of High Quality Software

- Build and Design Embedded Software that is:
  - Maintainable
  - Testable
  - Portable
  - Robust
  - Efficient
  - Consistent

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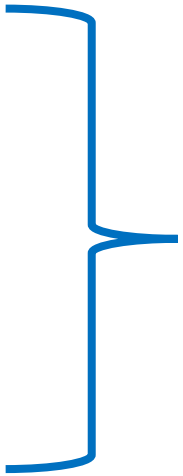


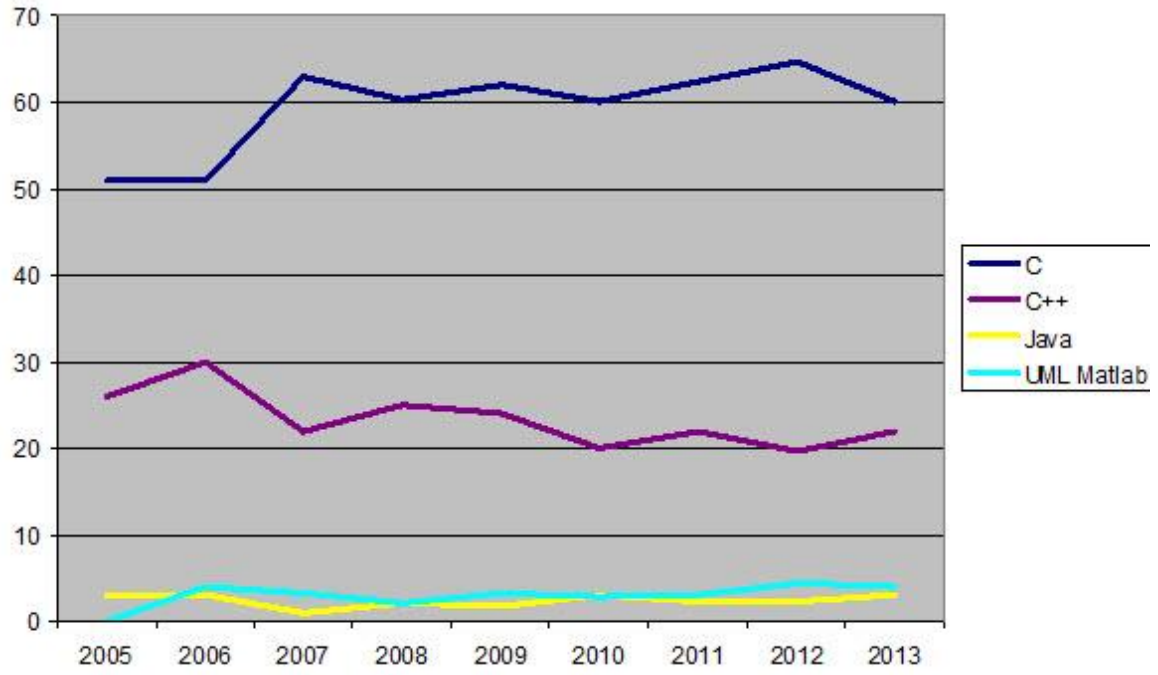
Goals for the course

Advanced hardware cannot make up for inefficient and buggy code!!!

Embedded Software Popularity

- Many Languages
  - C
  - C++
  - Java
  - Ada

- C-Programming is most used for embedded software



Embedded Software Market Share[1]

Embedded C-Features:

- Efficient Memory Management
- Timing Centric Operations
- Direction Hardware/IO Control
- Code Size Constraints
- Optimized Execution

“Optimum Features with minimum space and time”