Jump Starting Code Development to Minimize Defects

Class 1: Errors, Defects and Bugs

December 10, 2018

Jacob Beningo

DesignNews

CEC CONTINUING EDUCATION CENTER

Presented by: Digi-Key ELECTRONICS

Course Overview

Topics:

- **Errors, Defects and Bugs**
- Managing Design Processes
- The Jump Start Development Process
- Mastering Application Tracing
- Advanced Techniques

The Lecturer – Jacob Beningo

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- EDN : Embedded Basics
- ARM Connected Community

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Jacobs CEC Courses

CEC 2013 – 2015

- Fundamentals of Embedded Software (2013)
- Mastering the Software Design Cycle (2014)
- Python for Embedded Systems(2014)
- Software Architecture Design (2014)
- Baremetal C (2015)
- Mastering the ARM Cortex-M Processor (2015)
- Writing Portable and Robust Firmware in C (2015)
- Design Patterns and the Internet (2015)

CEC 2016 - 2017

- Bootloader Design for MCUs (2016)
- Rapid Prototyping w/ Micro Python (2016)
- Debugging (2016)
- Professional Firmware (2016)
- API's and HAL's February 2017
- Baremetal to RTOS April 2017
- Designing IoT Sensor Nodes July 2017
- From C to C++ October 2017

CEC 2018

- Connecting Edge Devices (March 2018)
- Building an IoT Connected PLC (April 2018)
- Securing IoT Devices using Arm TrustZone (Nov 2018)
- Minimizing Defects (Dec 2018)

Side Topics 2018

- **TrustZone Technology Primer**
- RTOS Workshop
- Debugging Techniques

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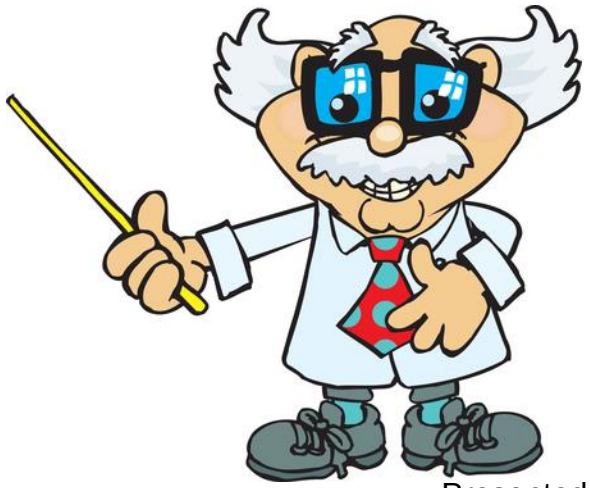
Session Overview

- The Greatest Development Challenge
- Defect Management
- Design Processes
- Development Processes
- Debugging Techniques
- Rate your Skillz



Presented by:

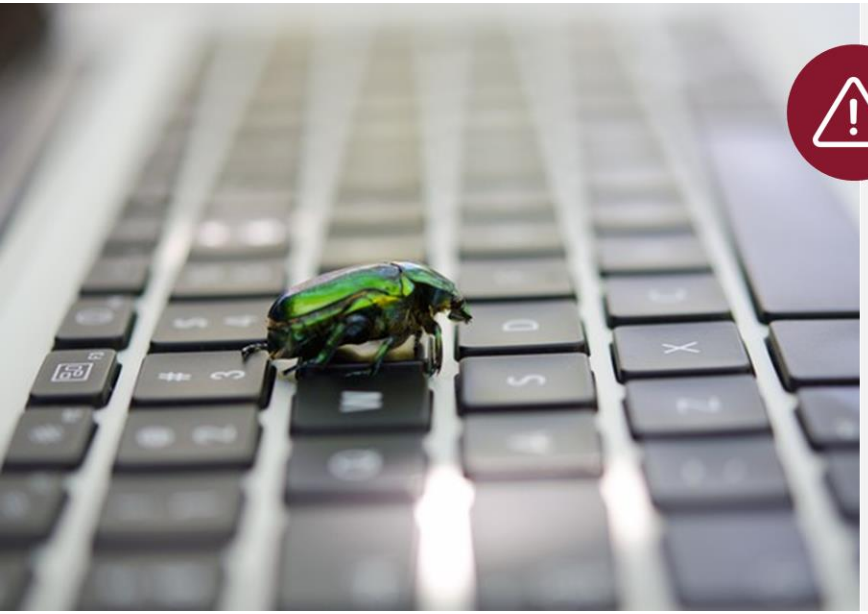
The Greatest Development Challenge

How much time do you spend debugging?

40% Developers on average spend 40% of the develop cycle debugging!

On a year long project, this is anywhere from 2.5 – 5 months!

The Greatest Development Challenge



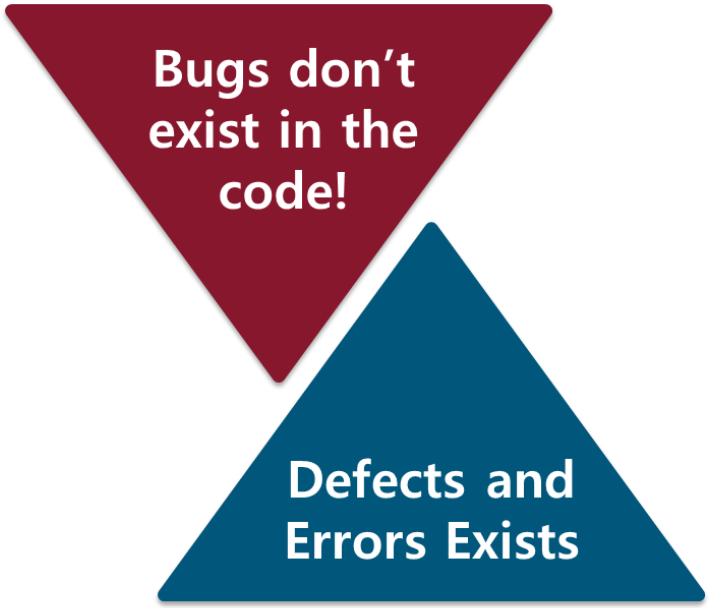
No other industry on the planet accepts error rates this high!

Defect Management

Errors are mistakes made by the programmer in implementing the software design.

Defects are mistakes that result from unanticipated interactions or behaviors that occur when implementing the software design.

The **developer** is responsible for **preventing** errors and defects not just removing them!

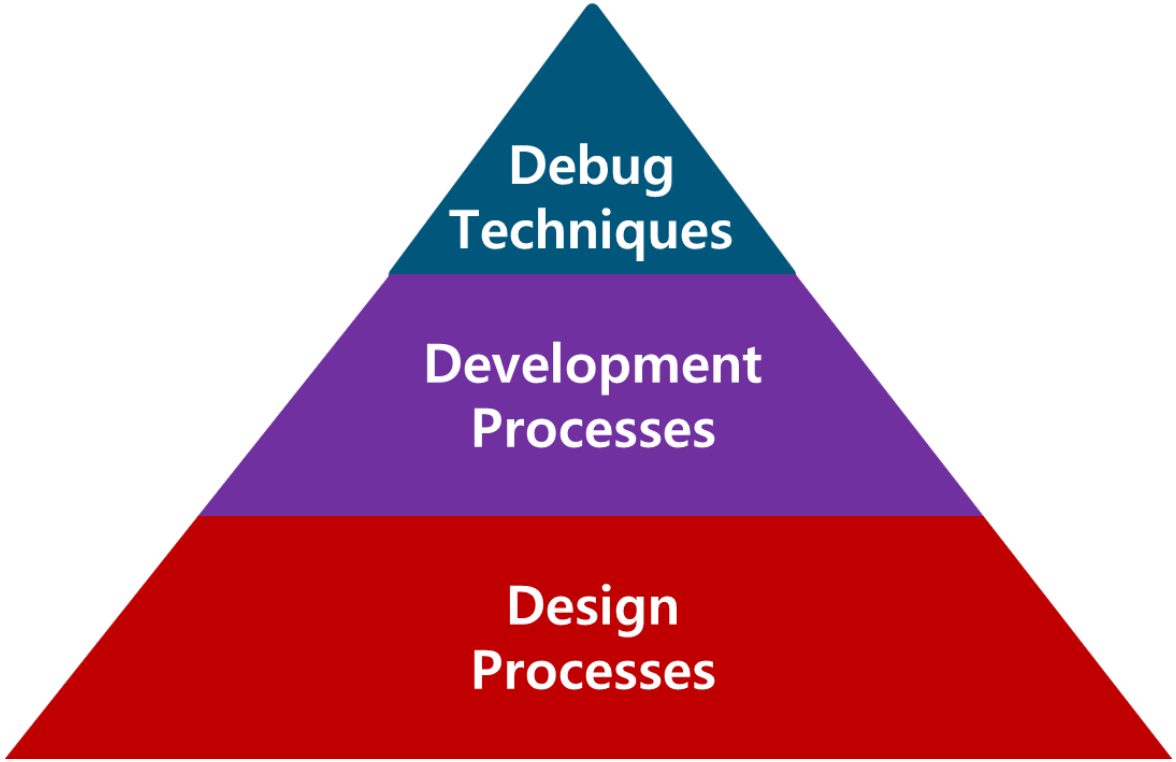


" Program testing can be used to show the presence of bugs but never to show their absence!"

- Edsger W. Dijkstra

Defect Management

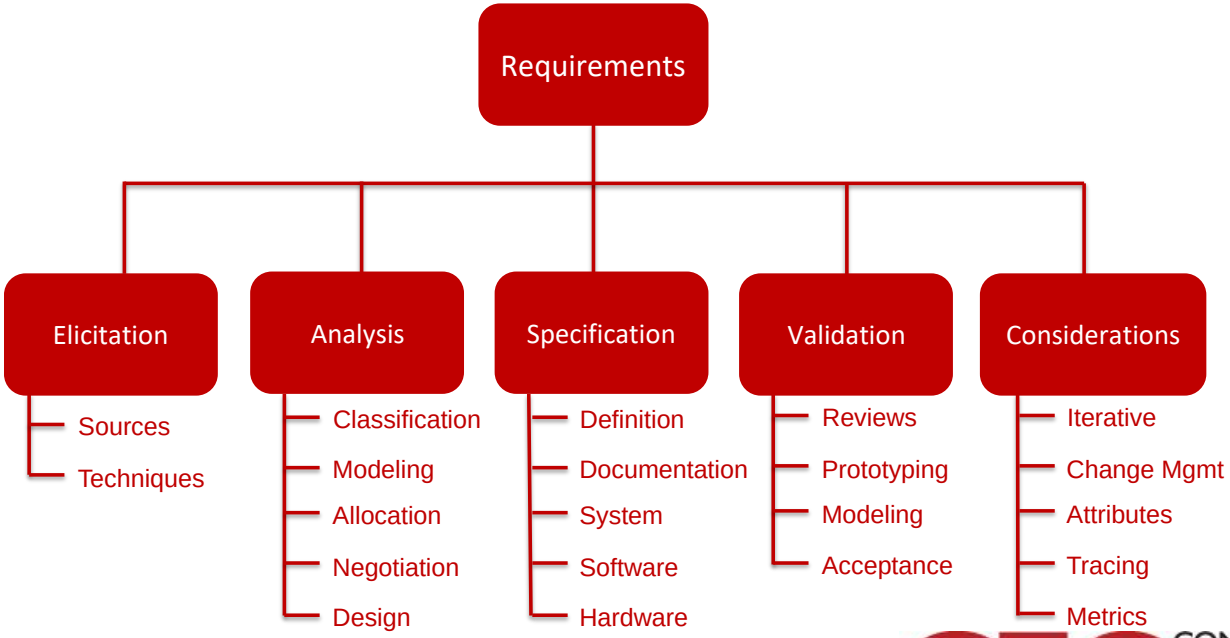
There are several different ways that developers can prevent and manage defects:



Design Processes

Design Processes are the first line of defense! These include:

- Proper requirements solicitation
- Careful software architecture design
- Minimization of complexity



Development Processes

Development Processes can minimize bug injection. Important processes to have include:

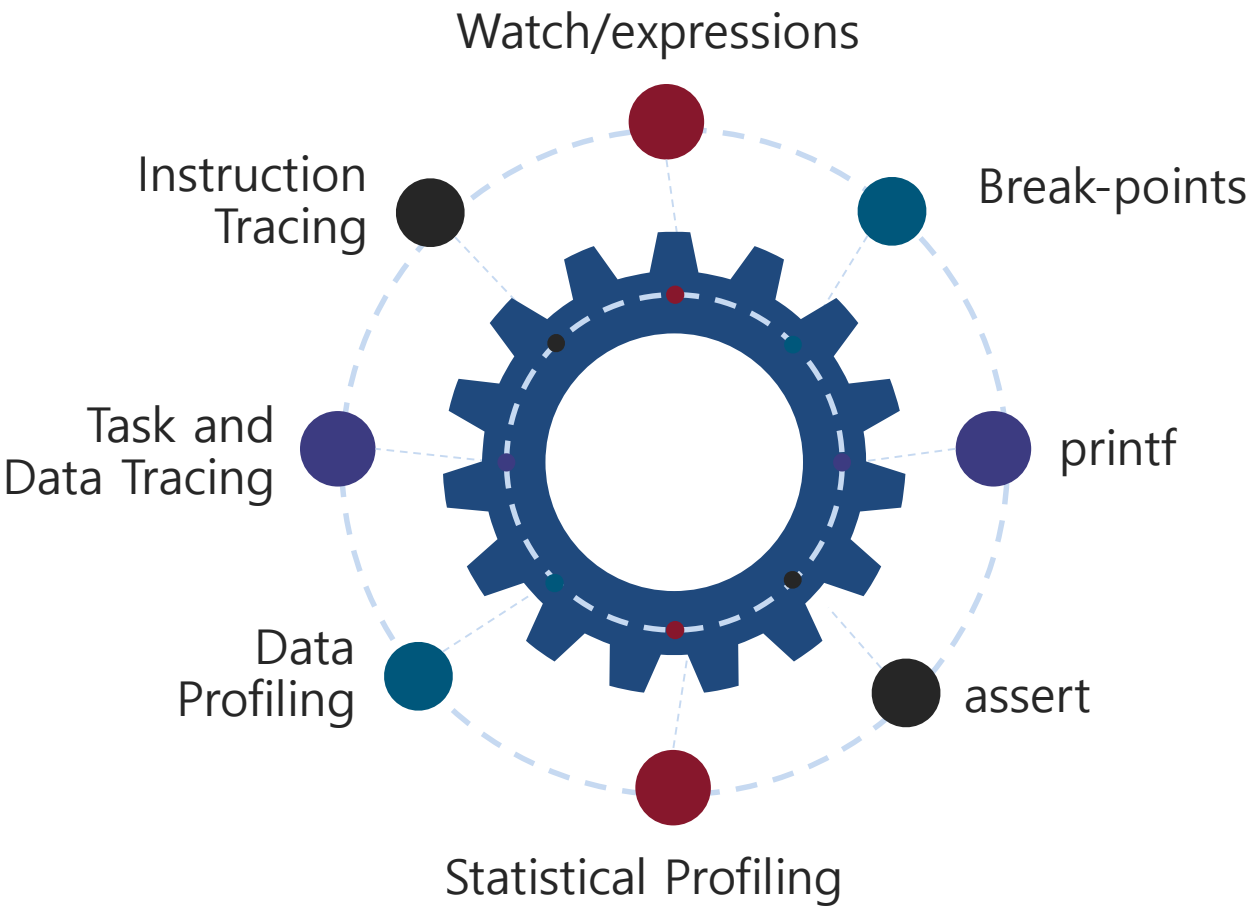
- Using a revision control system
- Applying coding style guides and standards
- Performing code analysis
  - static code analysis
  - dynamic code analysis
  - complexity
- Using industry best practices
- Utilizing modern debugging techniques
- Not rushing through development

Debugging Techniques

Debugging Techniques are designed to catch bugs as they occur or help developers find them ASAP. Techniques include:

- Breakpoints
- printf
- Assert
- Application tracing
- Instruction tracing
- etc

Rate your Skillz



Rate your Skillz

Results:

0 – 40	Stumbling in the dark ages
40 – 60	Crawling out of the abyss
60 – 80	Bug Squashing Connoisseur

Additional Resources

- Download Course Material for
  - C/C++ Doxygen Templates
  - Example source code
  - Blog
  - YouTube Videos
- Embedded Bytes Newsletter
  - http://bit.ly/1BAHYXm

From www.beningo.com under

- Blog > CEC – Jump Starting Code Development to Minimize Defects