

Team #TBD

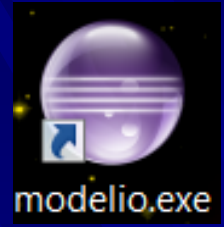
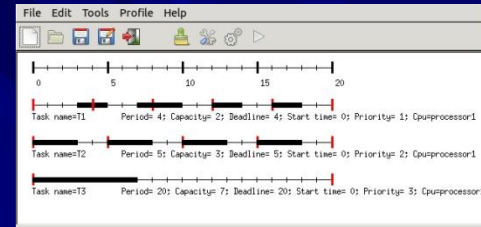
Member1, Member2, Member3, Member4 [Alphabetical]

*Real-Time Systems Software Proof-of-
Concept*

*[12+ Diagram Content Slides, Intro,
Roadmap, Summary – Move Irrelevant
Slides to Backup Section]*

Presentation Roadmap

- Capability Requirements
- Functional Design (Modelio, Visio Stencils, UML Stencils, MS Software Design Stencils, or Basic Drawing Tools in PowerPoint)
- Real-Time Requirements: Service Rates (T_i), Computational Load (C_i), and Deadlines (D_i) for 2 or More Services S_i
 - Cheddar Worst-Case Analysis
 - Scheduling Point / Completion Point Tests
 - Feasibility and Safety Overall
- Real-Time Analysis & Design
 - Cyclic Executive
 - RTOS
 - Linux POSIX Real-Time
- Proof-of-Concept and Time-stamp Trace



<http://beru.univ-brest.fr/~singhoff/cheddar/>

<https://www.modelio.org/>

CASE TOOLS USED: Modelio, Cheddar, Other?

Real-Time Analysis

- Timing Diagrams (Worst-Case Analysis)
- Cheddar Analysis
- Scheduling Point or Completion Test

System Models

- Block Diagram

Software Functional Models

- CFD/DFD
- Entity Relationship Diagram (ERD)
- Mealy/Moore State Machine
- Flowchart

Key Functional SA/SD Models – Content #1

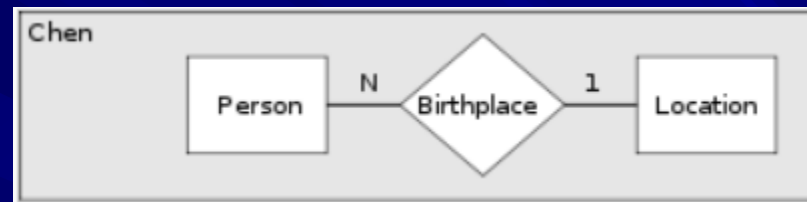
- CFD/DFD - Transformation/Even-Driven



CFD/DFD

http://en.wikipedia.org/wiki/Data_flow_diagram

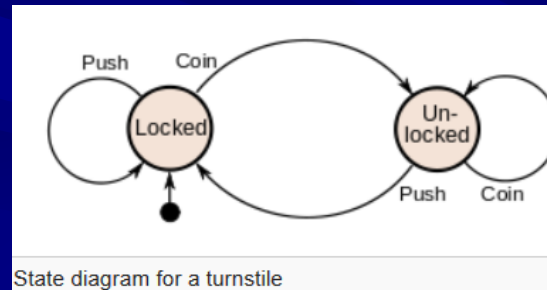
- ER/EER - Information Model



ER/EER

http://en.wikipedia.org/wiki/Entity%E2%80%93relationship_model

- State Machine – Behavioral

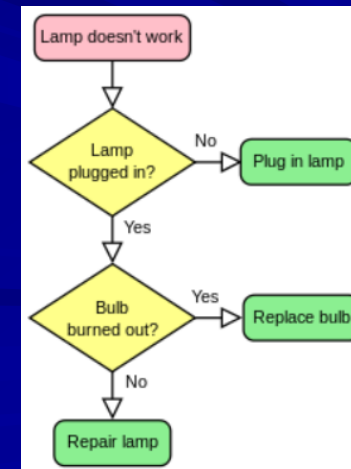


State diagram for a turnstile

http://en.wikipedia.org/wiki/Finite-state_machine

SM/EFSM

- Flow-Charts – Detailed Procedural

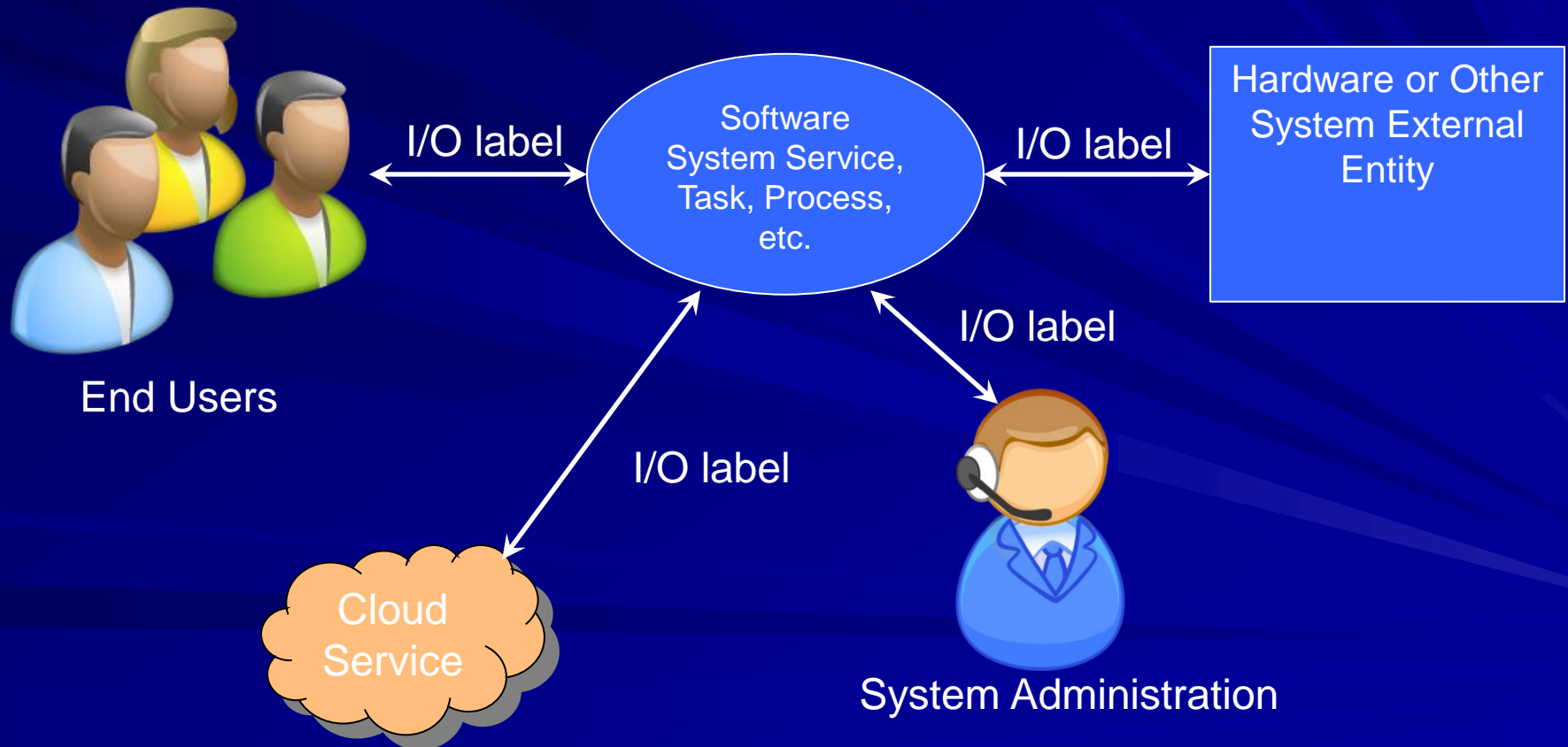


Flowchart

<http://en.wikipedia.org/wiki/Flowchart>

System Block Diagram – Content #2

- Any Useful Information about System
- Keep it Simple – One Page View of Everything
- Users, IT, Software, External Systems and Hardware



Capability Requirements

1. Capability #1
2. Capability #2
3. Capability #3
4. Capability #4

Real-Time Requirements

1. RT Requirement #1
2. RT Requirement #2

Performance Requirements

1. WCET Requirement #1
2. WCET Requirement #2

Service Set Feasibility and Safety ANALYSIS

- WCET
- Expected Ci
- RM LUB Test
- Cheddar Analysis for Worst-Case and Simulation
- Scheduling Point, Completion Test
- Feasibility
- Margin
- Safety

SA/SD CFD/DFD DESIGN

ER/EER DESIGN

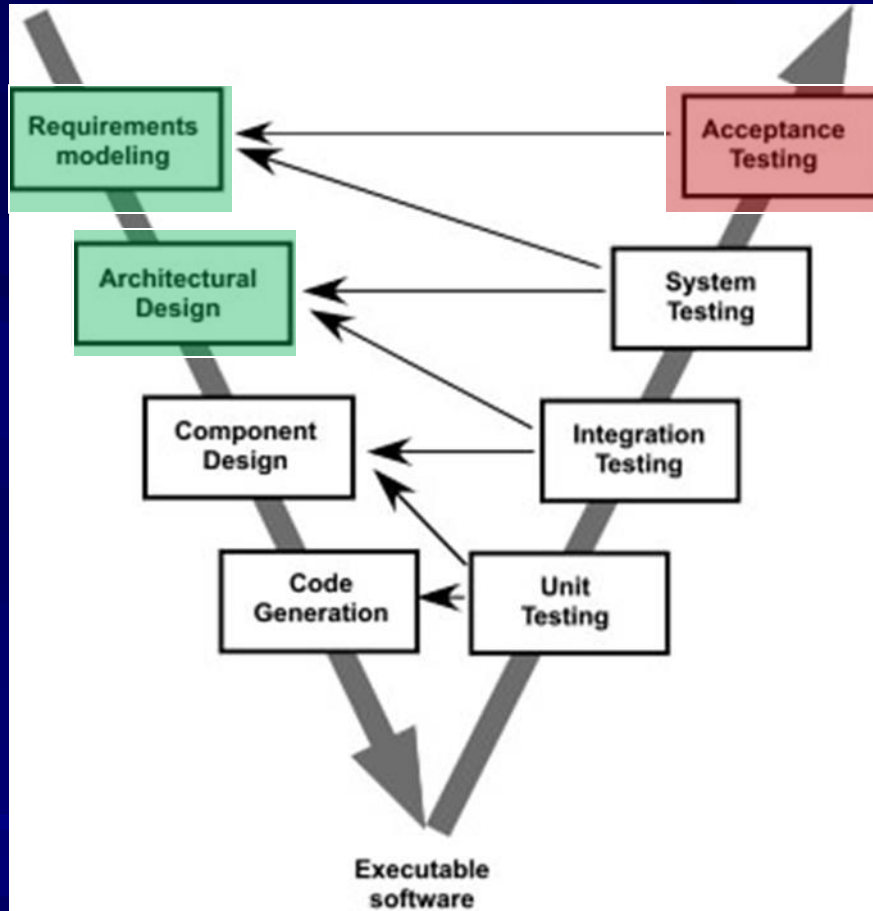
SA/SD State Machine DESIGN

SA/SD Flowchart DESIGN

Proof-of-Concept ANALYSIS

- Detailed Description of Platform Resources (Jetson TK1 or Texas Instruments Tiva TM4C Dev Board)
- Prototype Implementation of Key Services (2+)
- Time-stamp Tracing of Key Services
- [Profiling of Key Services - Optional]
- Purpose
 - Addresses High Risk Design/Implementation
 - Real-Time Risks (Deadline, Deadlock, Inversion)
 - Resource Use Analysis
 - Resource Margin for Safety

Highlight Concurrent Verification & Validation Plans



■ Backlog

- Requirements, Design Validation, Requirements (RT and Funcional), Design Verification Plans
- Acceptance Test Plans
- System Testing
- Integration Testing
- Unit Testing
- Component Design
- Code Generation

Software Engineering: A Practitioner's Approach, 8/e (McGraw-Hill, 2014)
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Summary

- Thank Audience
- Encourage Submission of Deficiency Sheets
- Open to Q&A for 10 Minutes

Backup Slides

Move Slides Not Making MUST
PRESENT Status to HERE for Q&A