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Problem. Solved.

Adaptable System Integration on Multiple Platforms

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Overview

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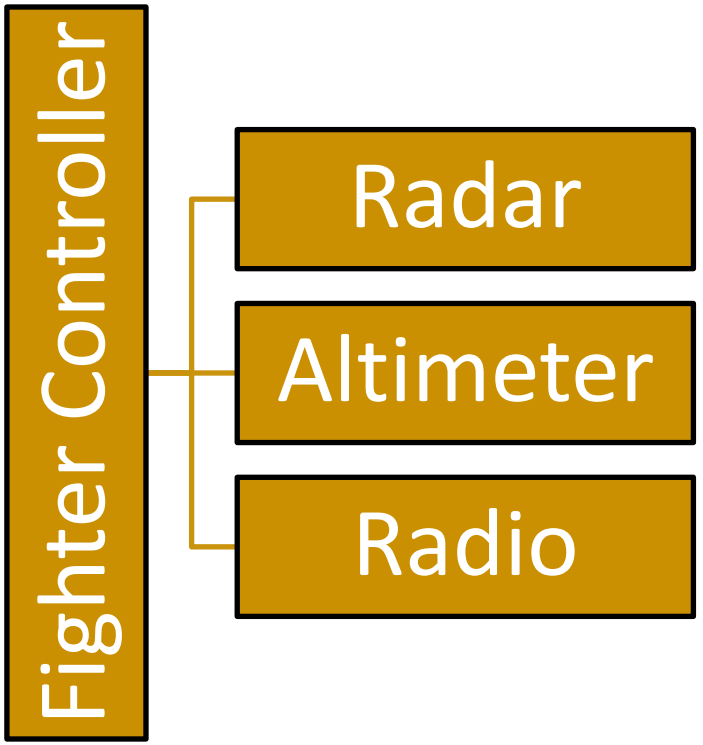
1. Problem Overview
2. Software Methods
3. Program Methods
4. Test Methods
5. Conclusion

Overview

1. **Problem Overview**
2. Software Methods
3. Program Methods
4. Test Methods
5. Issue Tracking

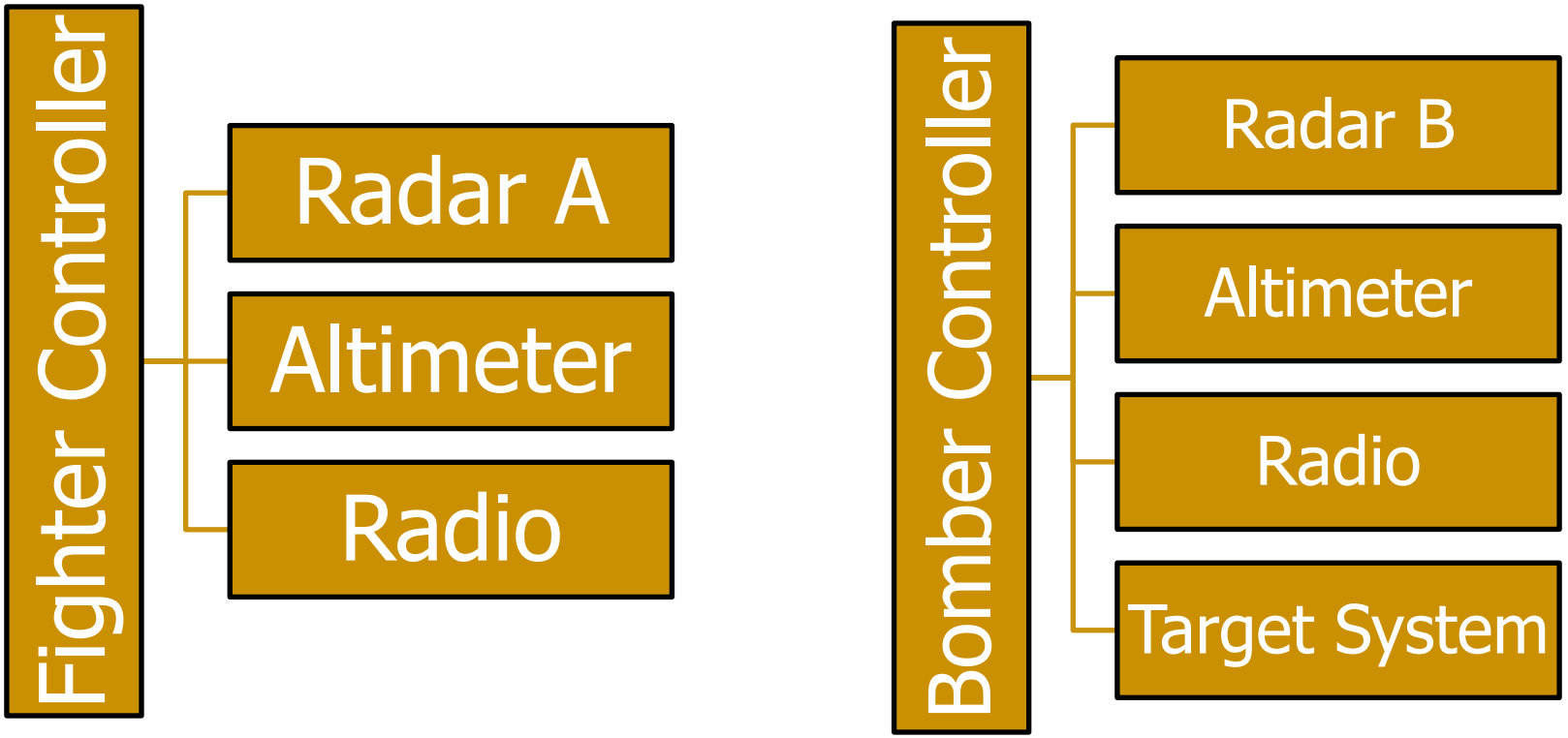
Problem Overview

- Controller Product
  - Controls and integrates multiple systems
  - Used on a Fighter



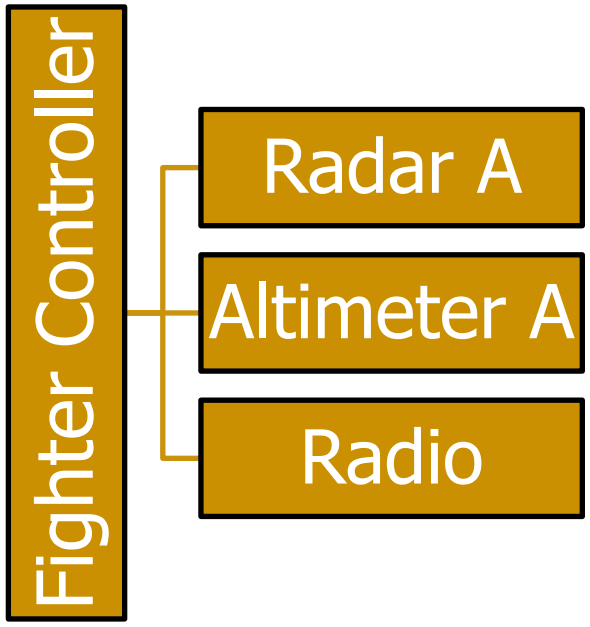
Problem Overview

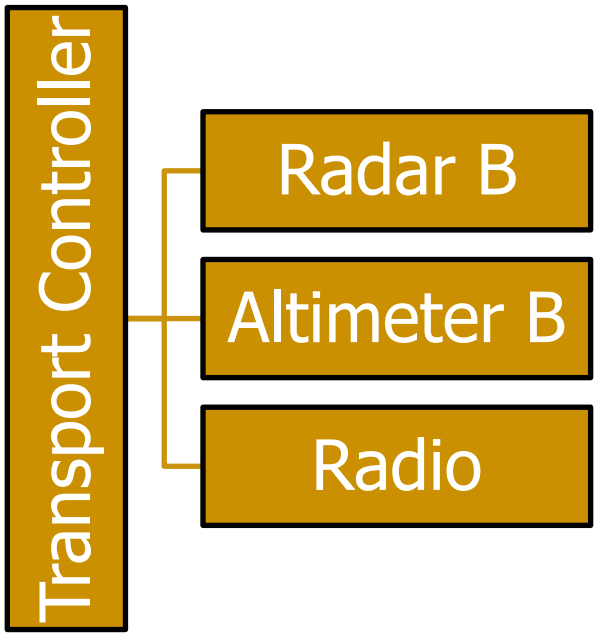
- Bomber Integration
  - Add Targeting system
  - Add different Radar

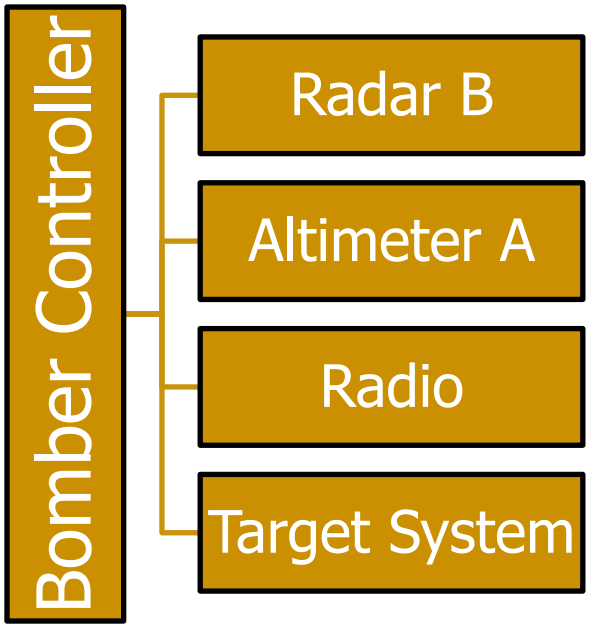


Problem Overview

- Transport Integration
  - Add different Altimeter







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Software Methods

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- Software Practices
  - Platform decided at runtime
  - Platform decided at compile time
  - Separate software baselines
- Helpful Software Architectures

Software Methods - Runtime

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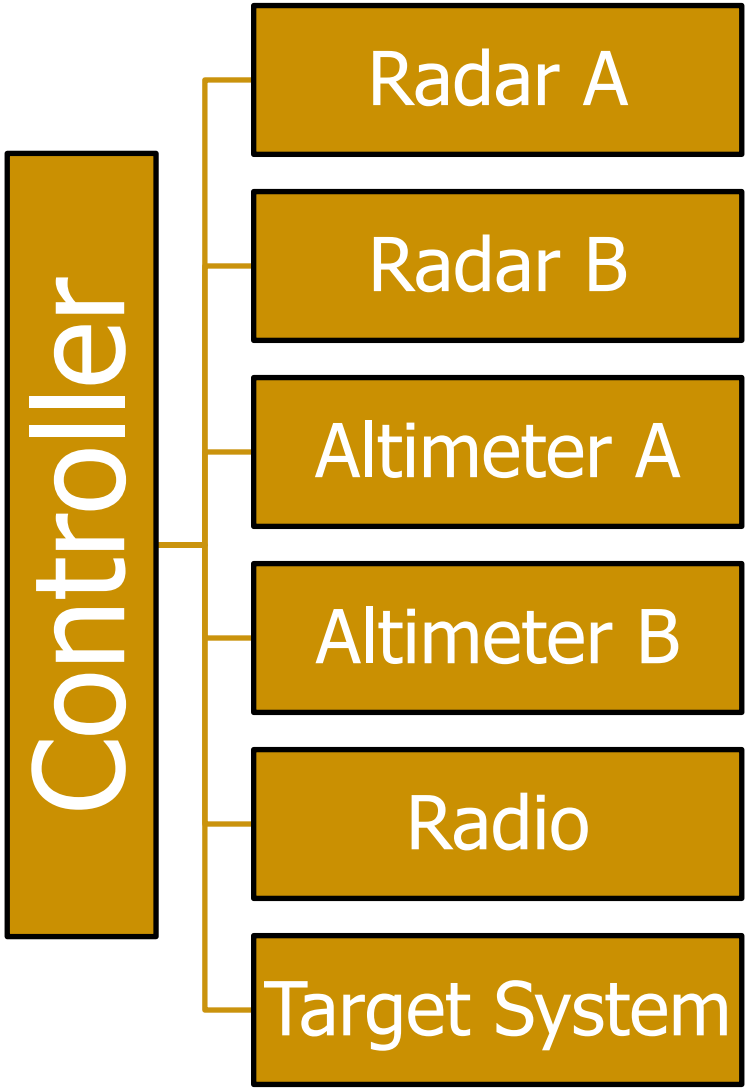
- Pros
  - Very adaptable to new platforms
  - Less software in the field
  - Changes benefit all platforms
    - Bugs will be fixed once
- Cons
  - More Complex Software
  - More processing and memory needed



Software Methods - Runtime

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- Program Effects
  - High initial cost with long term low cost
  - High initial risk with long term low risk
  - Depot software load is operational for any platform
  - Low effort in issue tracking
- Test Effects
  - Unit level testing can be used for any platform
  - Similar tests can be created to execute for each platform

Software Methods- Compile Time

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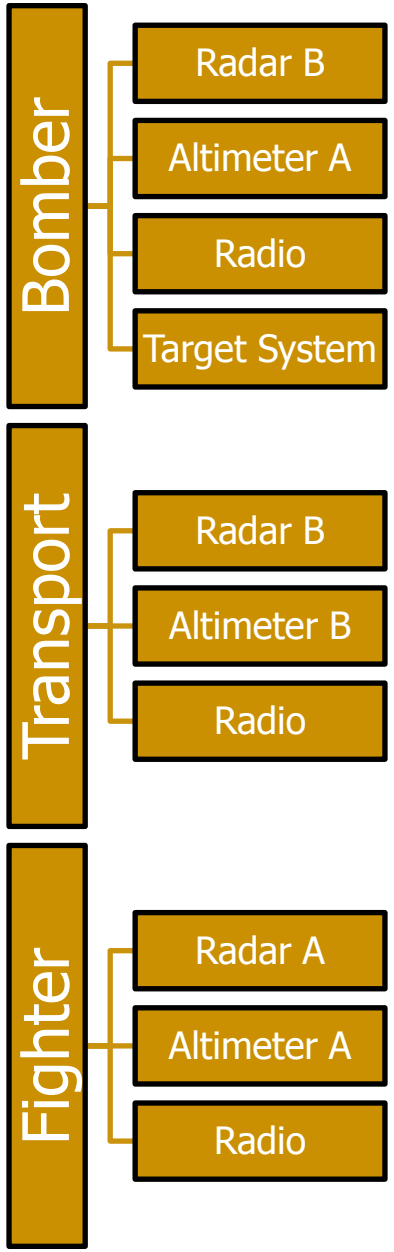
- Pros
  - Adaptable to new platforms
  - Changes may benefit all platforms
  - Less memory usage
- Cons
  - Multiple releases in the field
  - Changes may only benefit one platform
    - May need to fix one bug multiple times



Software Methods- Compile Time

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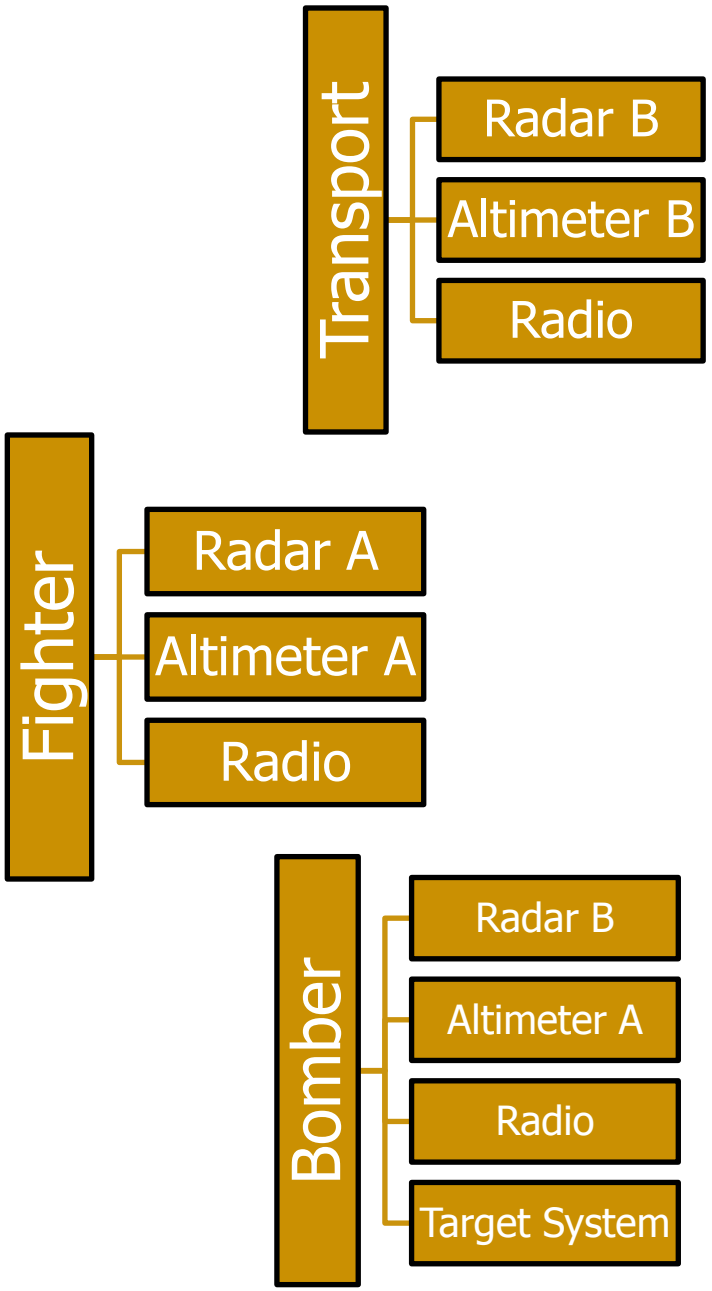
- Program Effects
  - Medium initial cost with long term medium cost
  - Medium initial risk with long term medium risk
  - Software must be loaded in the field
  - Medium effort in issue tracking
- Test Effects
  - Unit level testing may be used for any platform
  - Similar tests can be created to execute for each platform

Software Methods- Separate Software

- Pros
  - Clean Code
  - Minimal memory usage
  - Minimal Processing
- Cons
  - Changes only benefit one platform
    - A bug will need to be fixed for each platform
  - Not adaptable to new platforms
  - Code could diverge into multiple designs



Software Methods- Separate Software

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- Program Effects
  - Low initial cost with long term high cost
  - Low initial risk with long term high risk
  - Software must be loaded in the field
  - High effort in issue tracking
- Test Effects
  - Code inspections quicker with less code to review
  - Unique tests must be created for each platform

Software Methods- Summary

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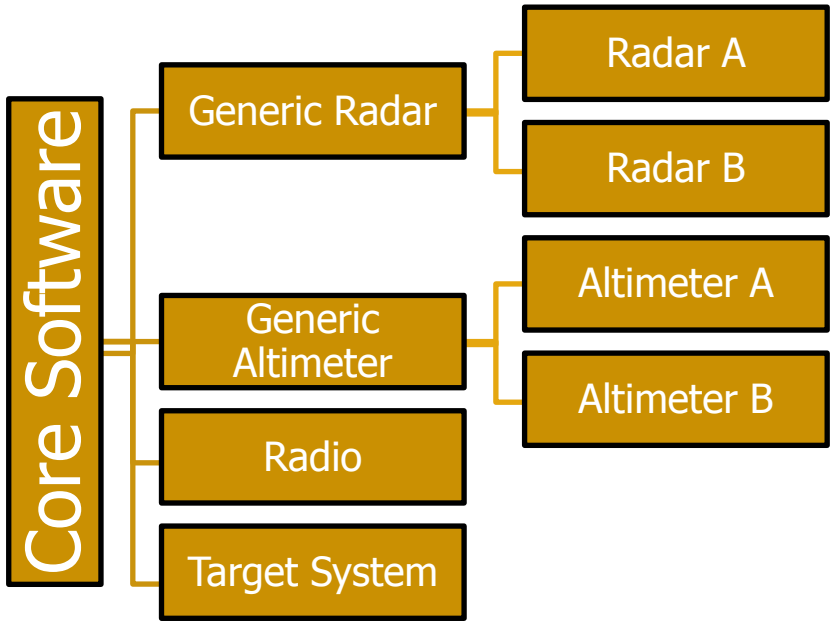
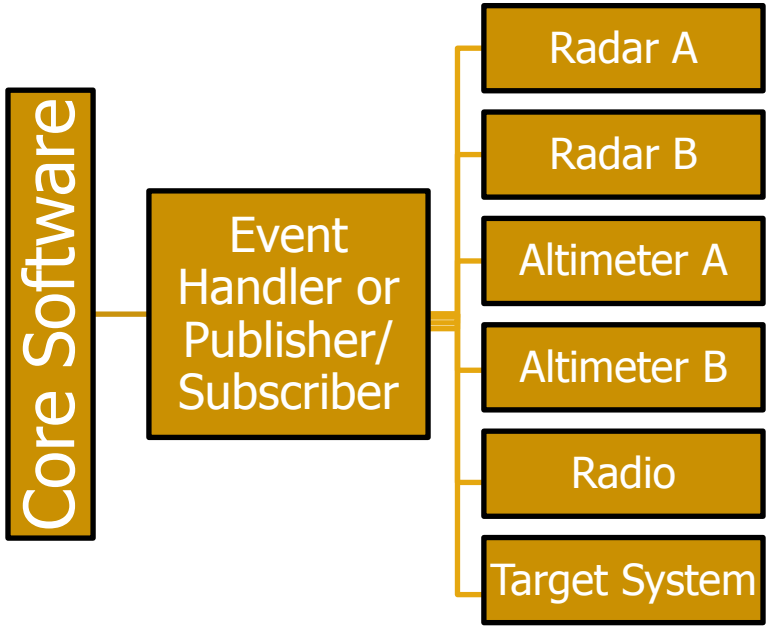
- Platform decisions at run time, while initially more risky and more expensive have a more favorable long term outcome
- Platform decisions at compile time, while initially less risky and less expensive do not offer long term advantages
- Separate software is a tempting short term solution, but will be the most risky and costly method over the long term

Software Methods- Architecture

- Separate inputs from core software
  - Minimize subsystem impacts on core software
  - Allows core software to easily add new systems or adapt to subsystem updates





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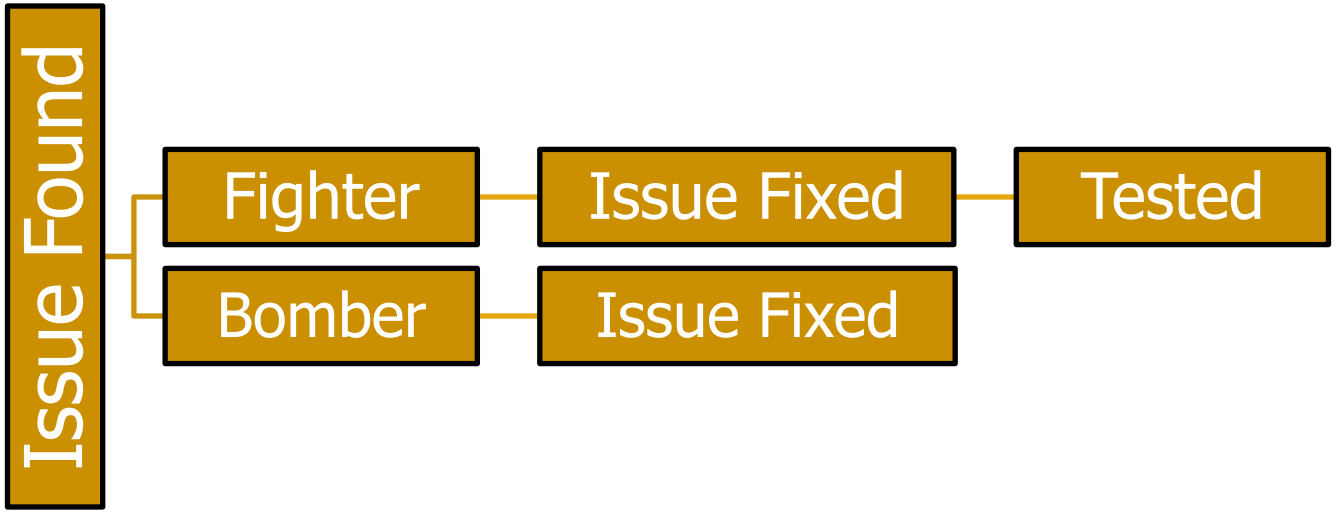
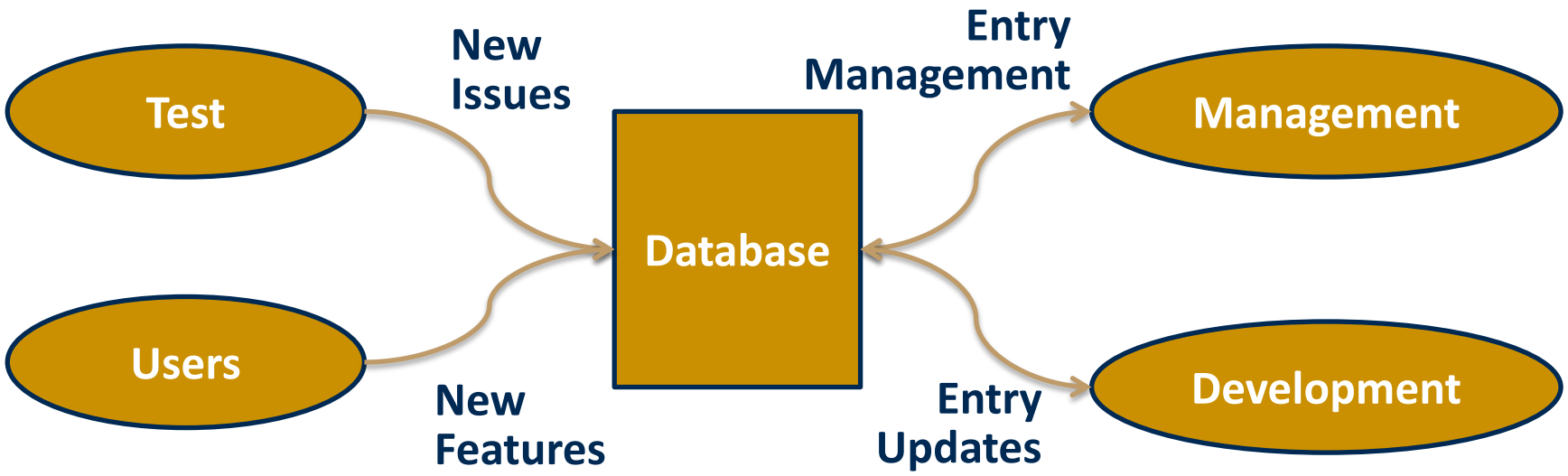
Program Methods

- Problem Report Tracking Database
  - One change request (CR) for each problem report on each platform
  - CR is closed when software is tested for a platform
  - Sibling CRs track a common issue on multiple platforms



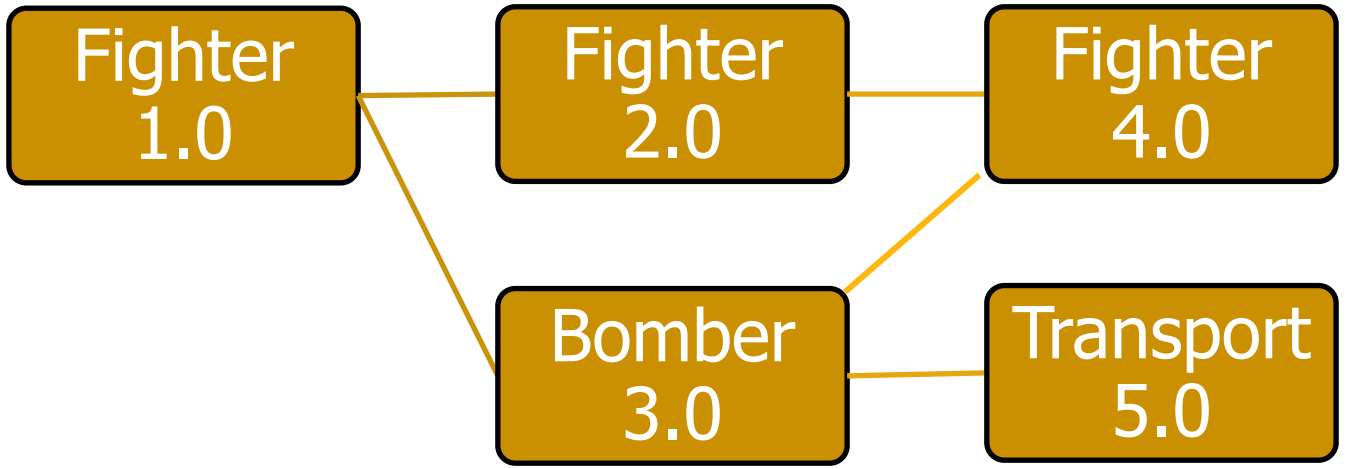
Program Methods

- CR Tracking Database Considerations
  - Users of tracking system
  - Data/metrics tracked
    - Platform found, Applicable platforms
  - Traceability from test to issue documentation



Program Methods

- Configuration Management
  - Development paths allow different platform development efforts to occur in parallel
  - Merge development paths to reduce the amount of variants
    - **Only for Runtime or Compile time software**
  - Configuration Management tools help manage multiple development paths



Program Methods

- Requirements Management
  - Use a requirements management tool such as DOORS
  - Each requirement is assigned to one or multiple platforms
  - Filters allow for one platform's requirements to be viewed
  - Used for System and CSCI level requirements

#	Description	Fighter	Bomber	Transport
10001	The system shall…	Yes	Yes	No
10002	The system shall…	No	Yes	No
10003	The system shall…	Yes	Yes	Yes

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Test Methods

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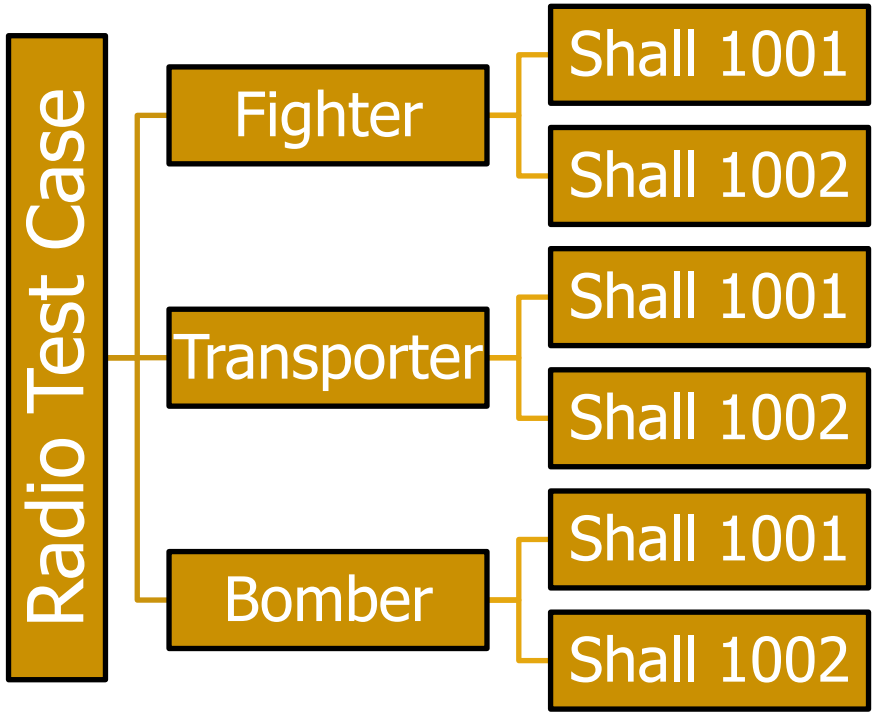
- Common Functionality Test
  - Generic test cases with customizable fields to quickly transition test from one platform to another
- Test File Creation and Maintenance
  - Careful test case planning can assist in reducing effort level when converting existing test files for one platform to test another platform

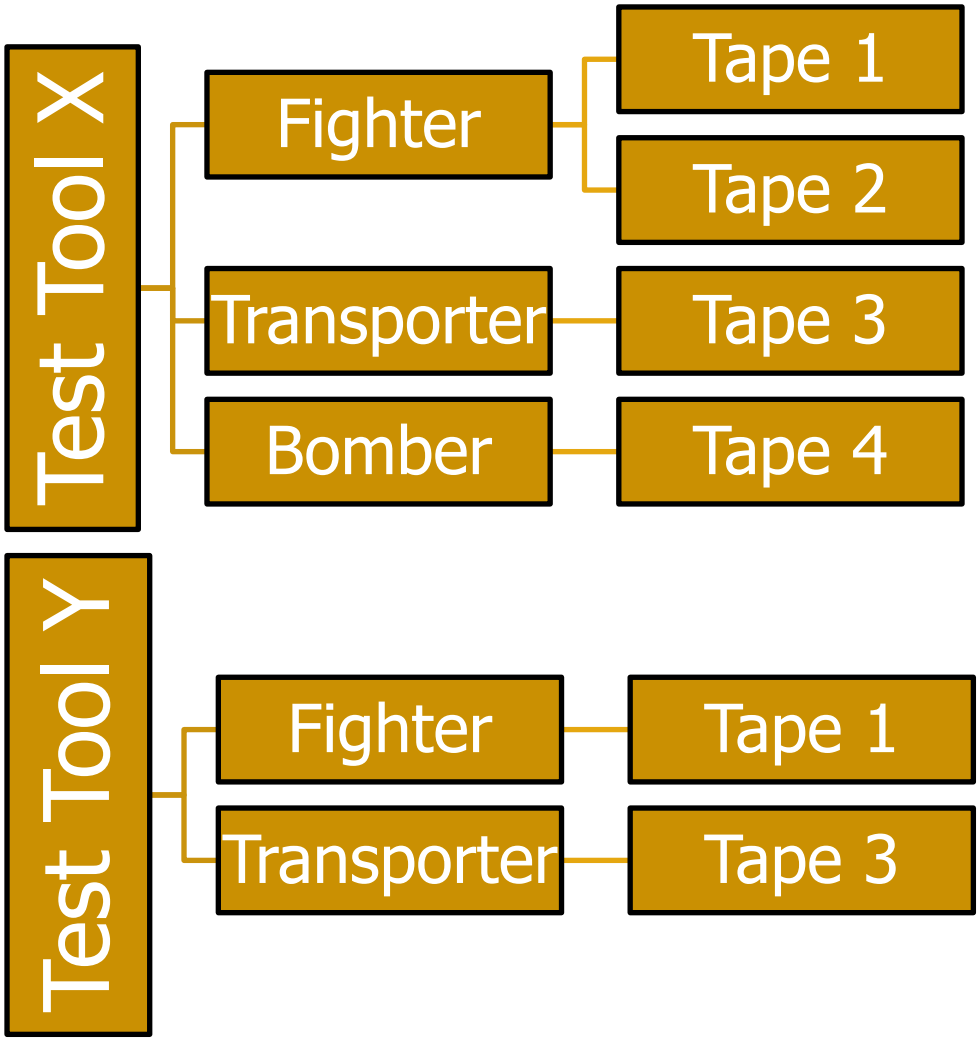
Test Methods- Common Functionality

- Creation of single test set to verify multiple platforms
- Requirements mapped to test cases only once



Test Methods – Test Files

- Configuration manage files by platform, test tool type, and software version
- Utilize commonalities across platforms for test file creation



Summary

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- Software, System and Test of an integrated system are interrelated components that must be considered as a whole.

- Supporting multiple platforms or configurations to leverage existing technology can be cost effective and improve common capability.

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Questions?

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