Unit Testing From the Trenches

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Introduction

- Test Driven Development and Design
- Real world examples
- Challenges with testing

https://github.com/astemes/astemes-gdevcon-2022

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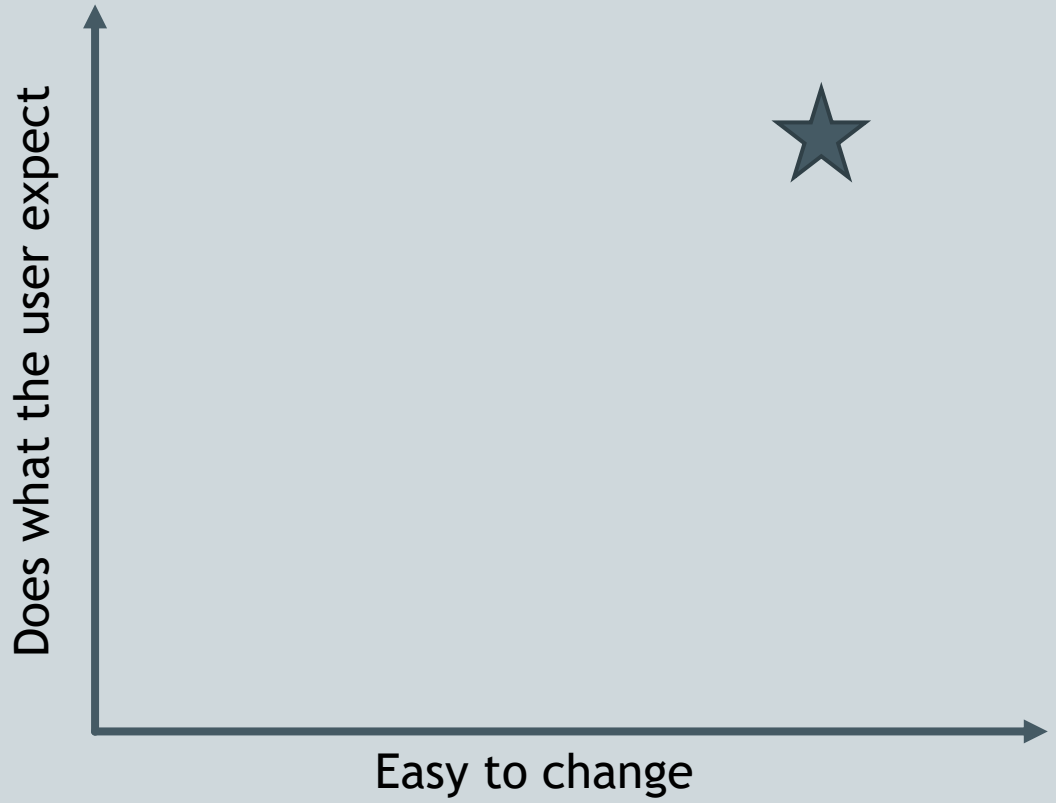
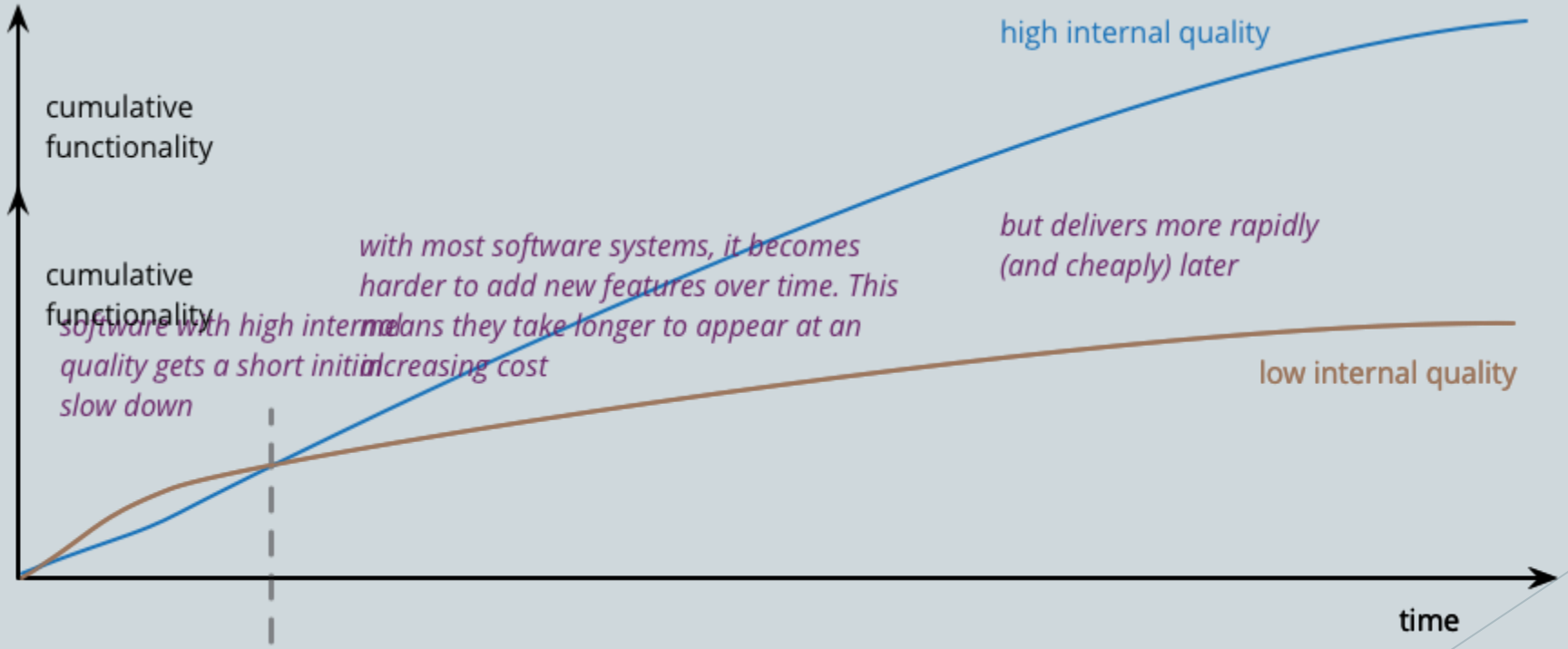
Software Quality



How to deliver high quality code at a high pace?

- The only way to go fast is to not make a mess while going



Source: https://martinfowler.com/articles/is-quality-worth-cost.html

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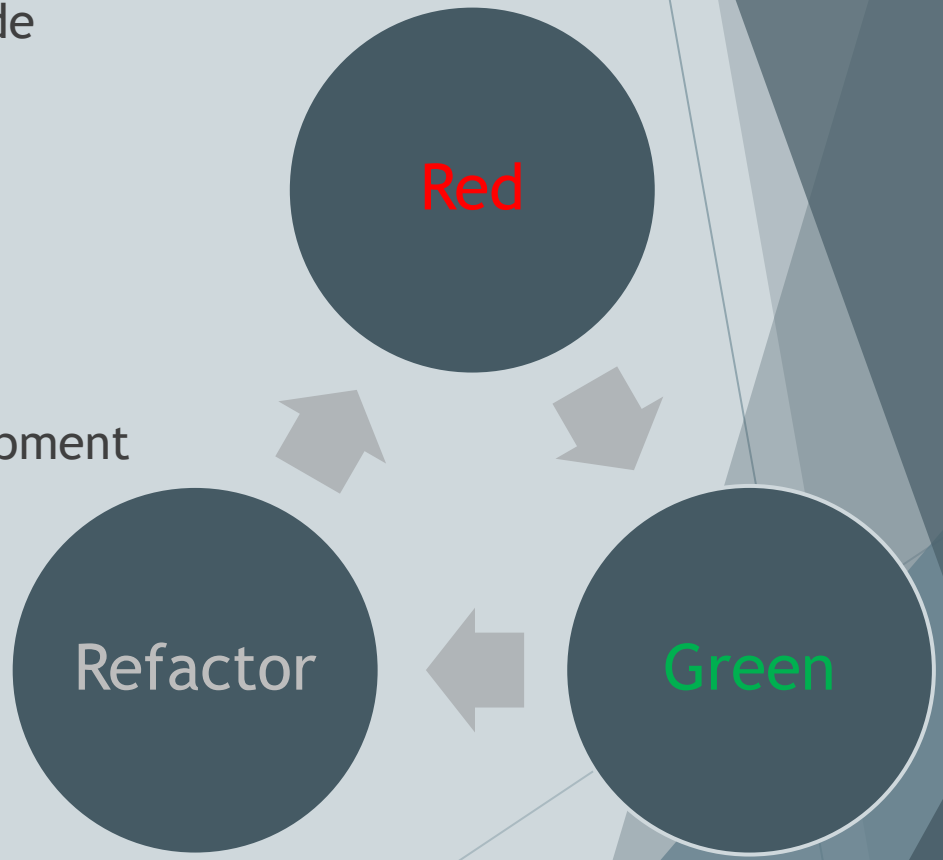
Test-Driven Development

- A test is created **before** writing **any** production code
- Code is developed to make the test pass
- Refactor to reduce duplication and clean up
- Red–Green–Refactor **cycle**
- Cycle time on the order of **minutes**
- Writing tests is not a separate activity from development



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Why bother with Test Driven Development?

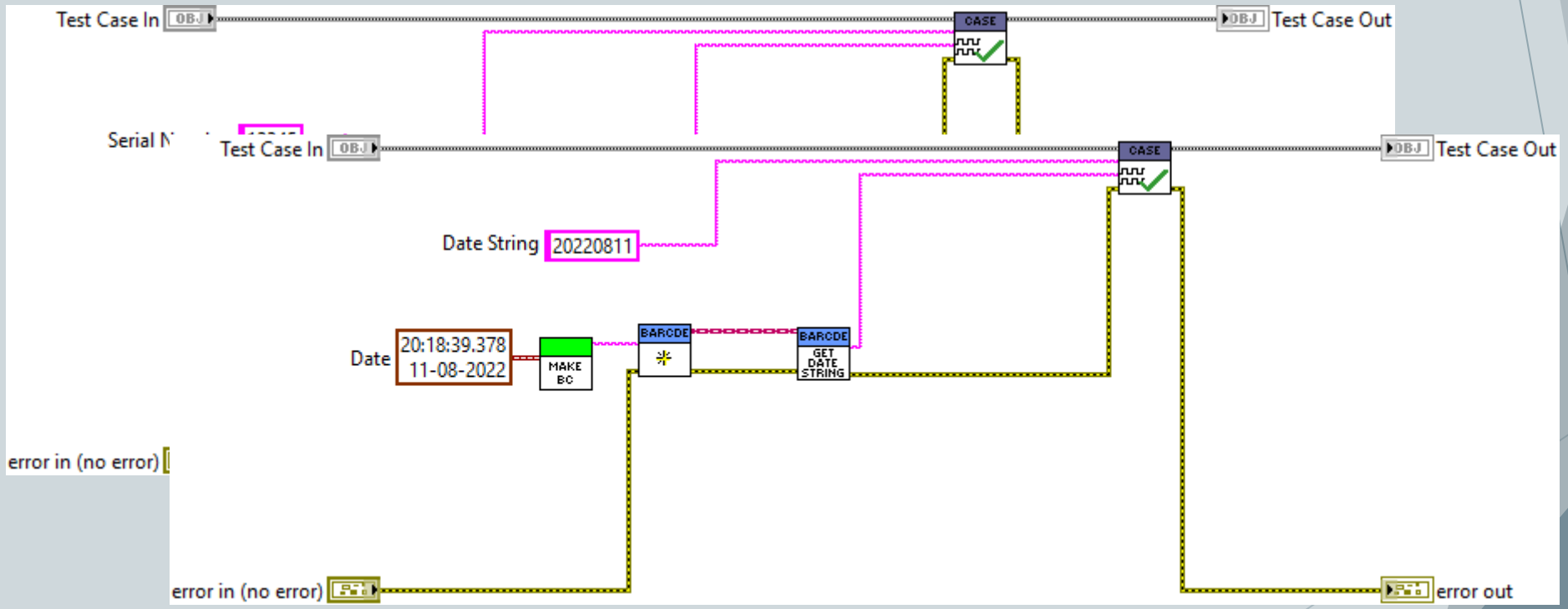
1. Improved Design
2. Self Testing Code
3. Less stress
4. Documentation

Test Driven Design

- What makes code testable?
  - Loose coupling
  - Clear APIs
  - Well managed dependencies
  - Clear responsibilities
  - Limited side effects
- What if we start with writing a test?

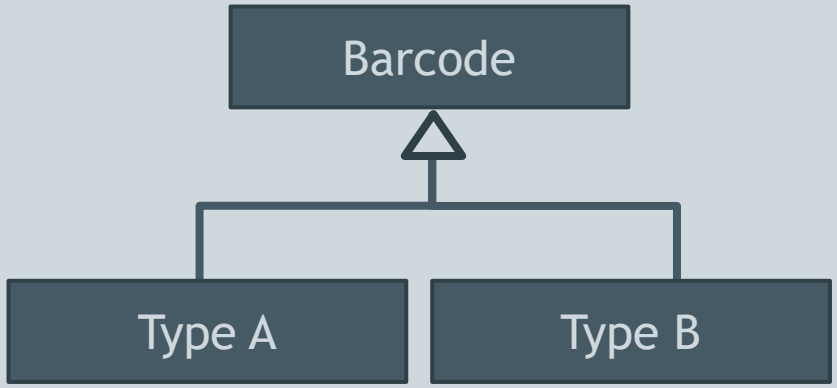
Example: Barcode Parser

$SN**12345**$DT**20220811**

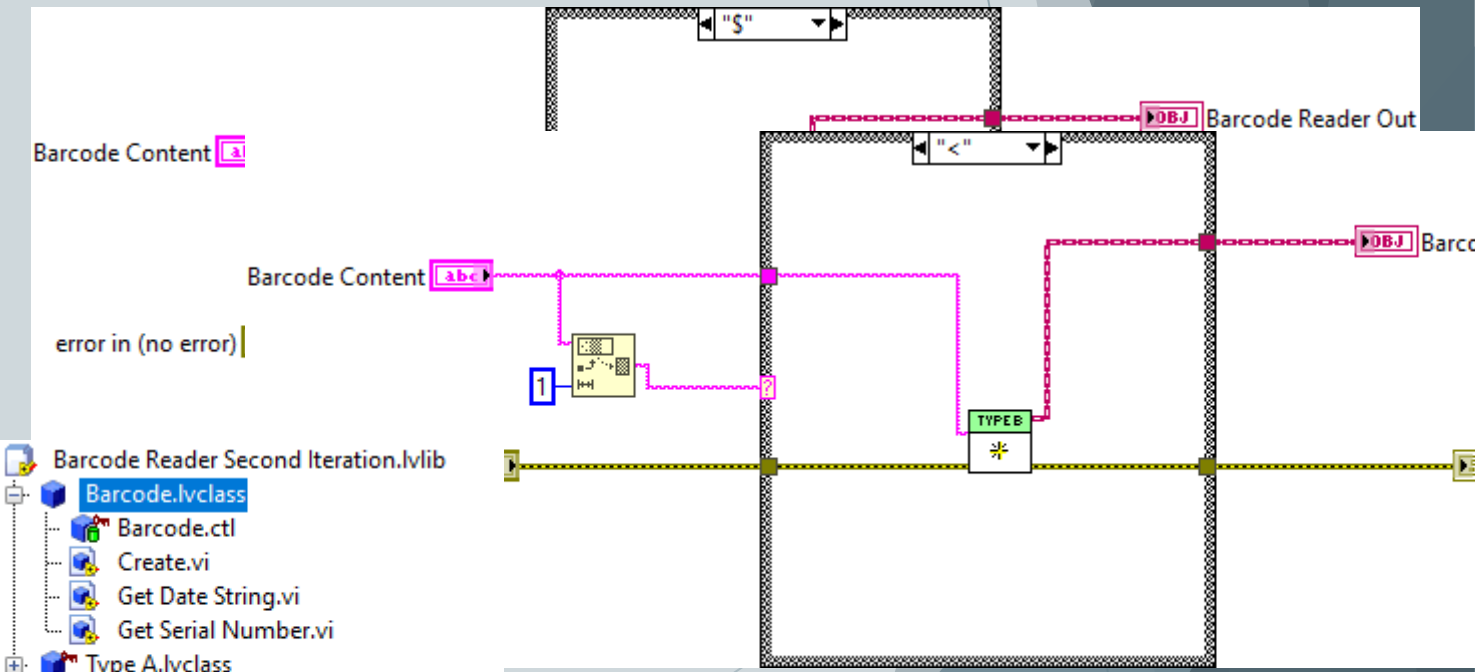


Example: Barcode Parser Extended

<SN>**12345**</SN><DATE>**20220811**</DATE>



Barcode.lvclass:Create.vi



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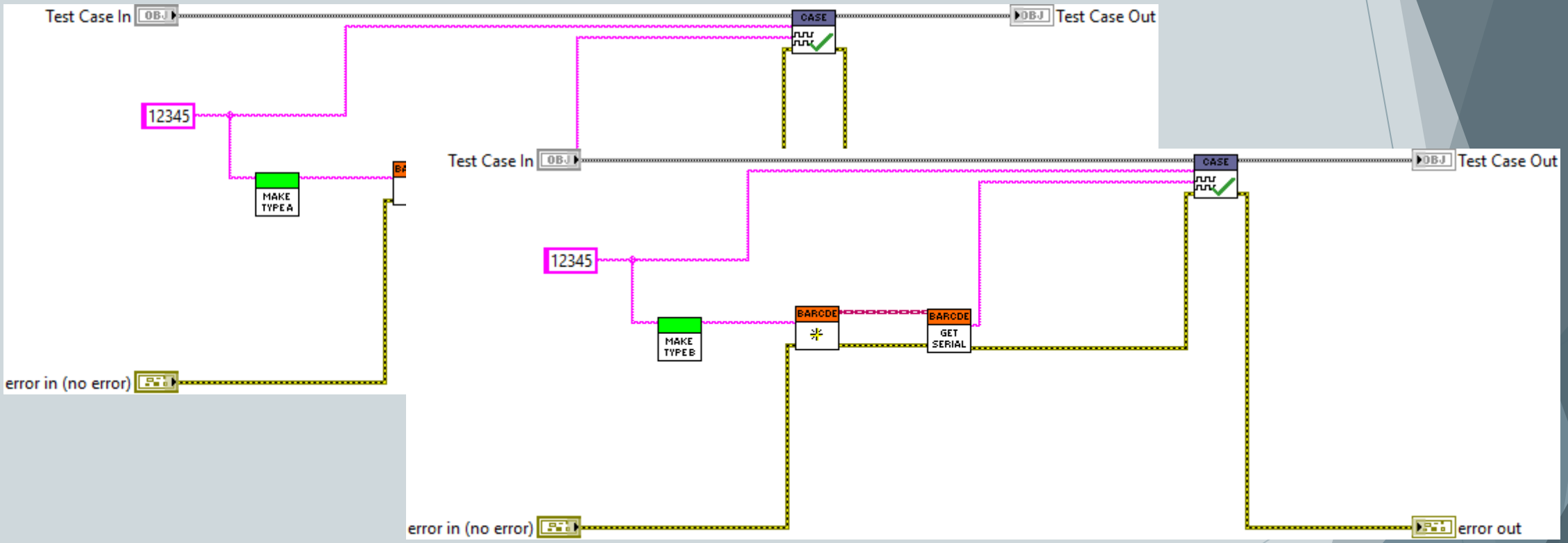
Example: Barcode Parser Extended Tests



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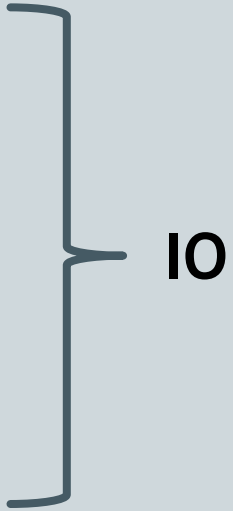
Sounds good, but…

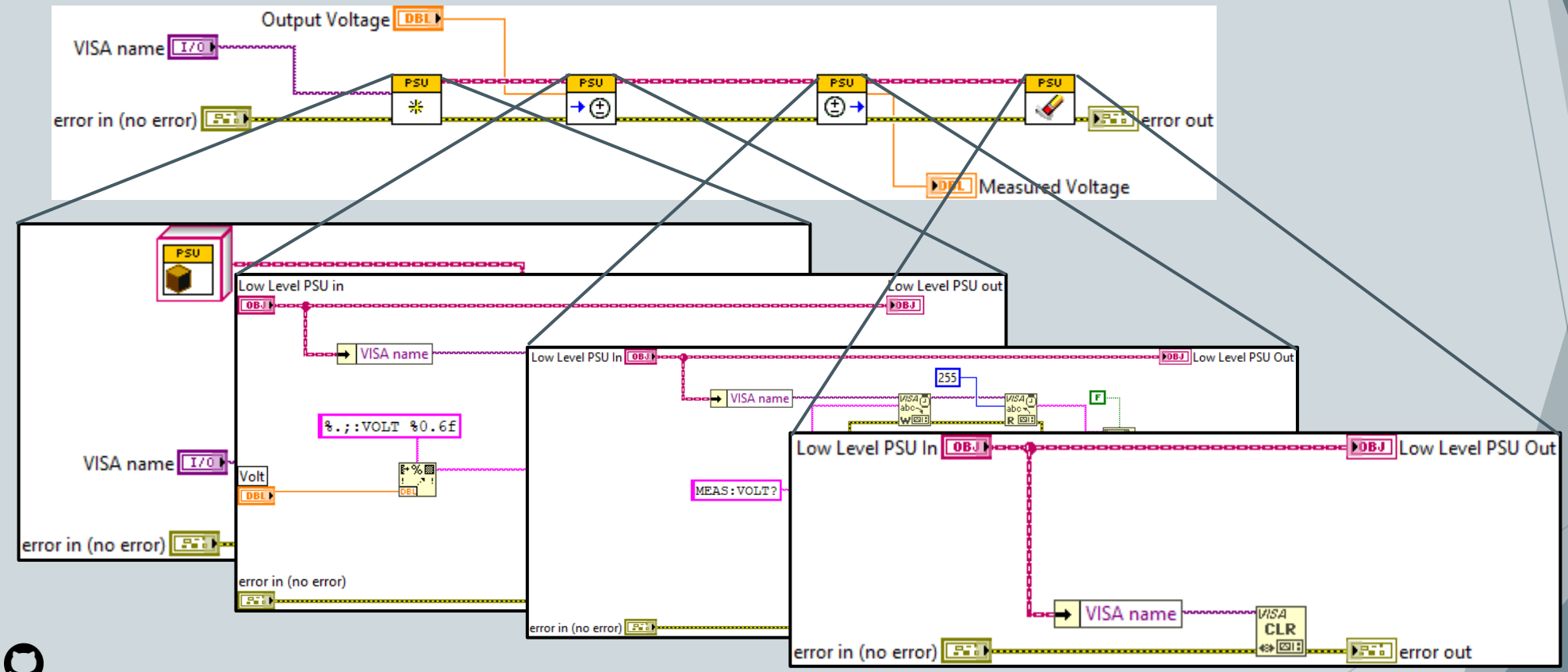
- Instrumentation
- Communication busses
- User interfaces
- Command Line
- Databases
- Reports



Testing at the Edges

- When something is difficult to test – get rid of the stuff which makes testing difficult

Example: Low Level Hardware



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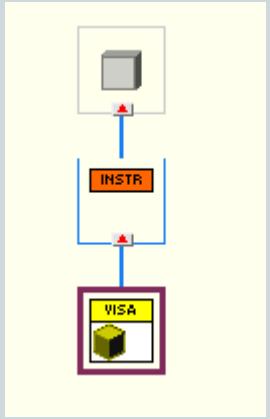
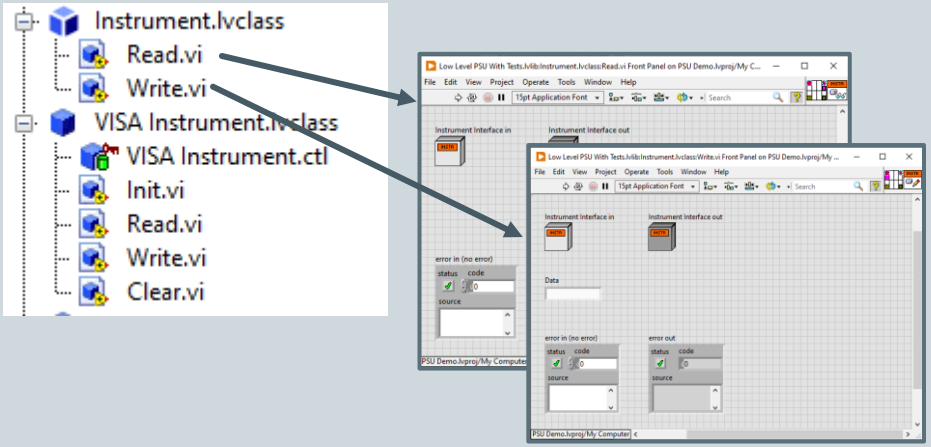
Pulling out VISA…





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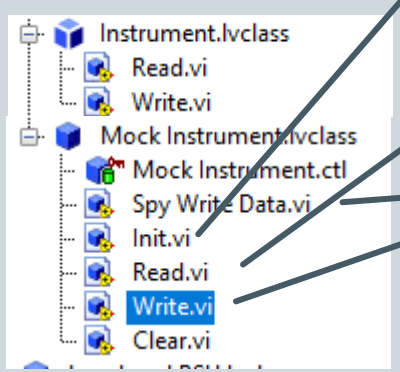
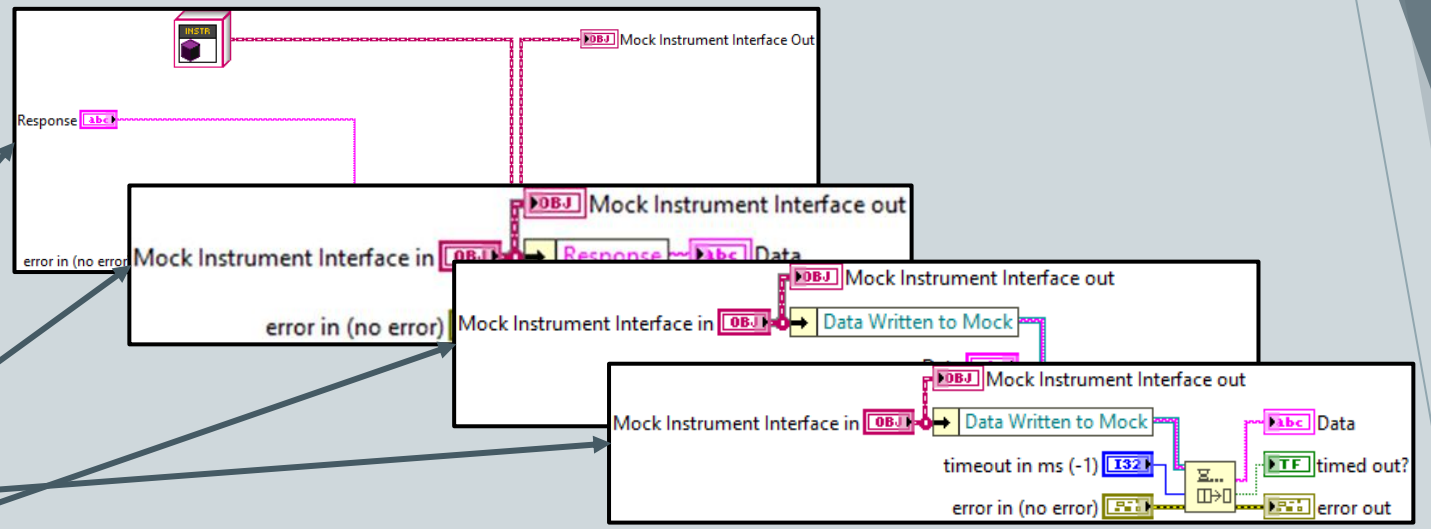
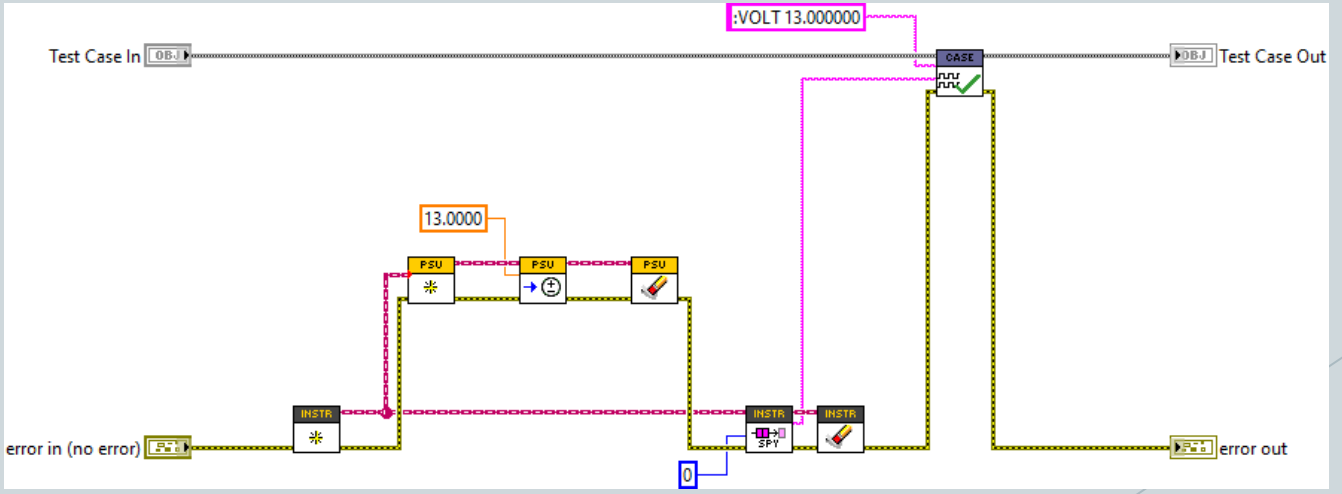
...faking it...







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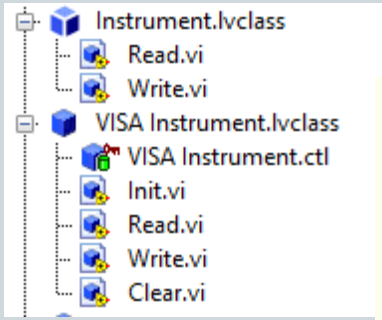
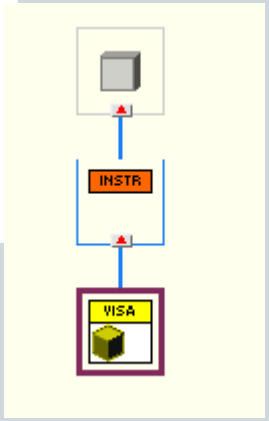
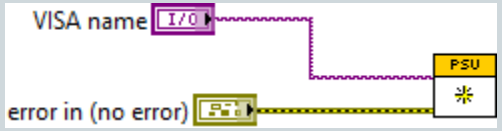
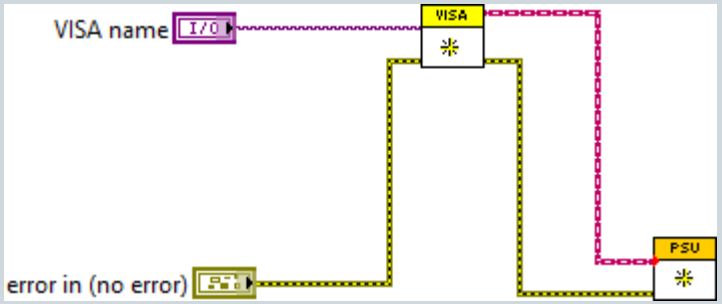
… and putting VISA back in

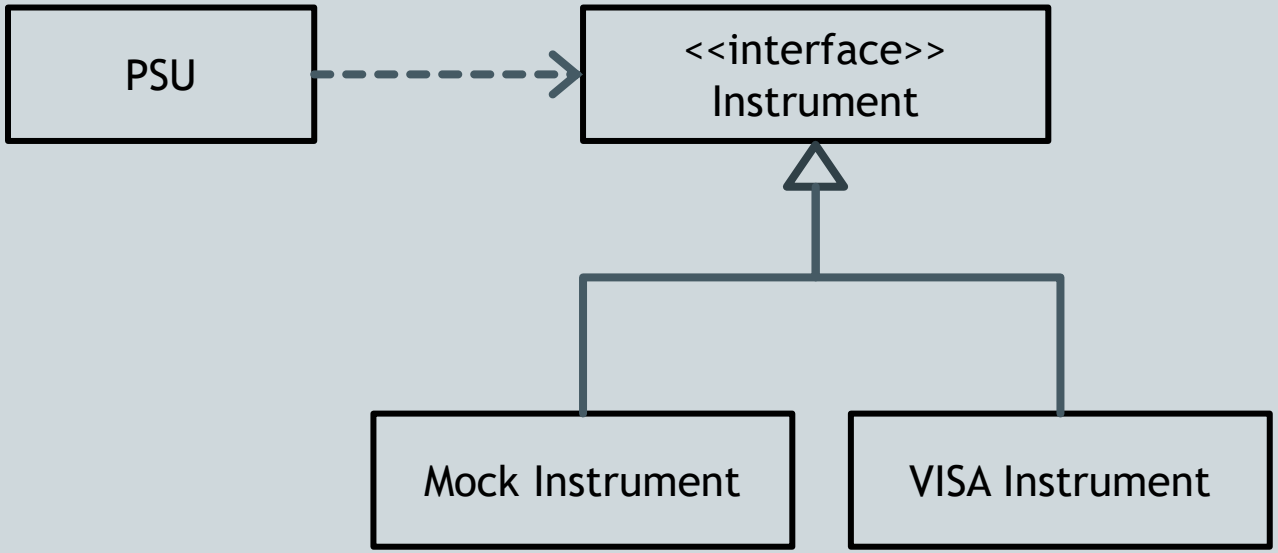




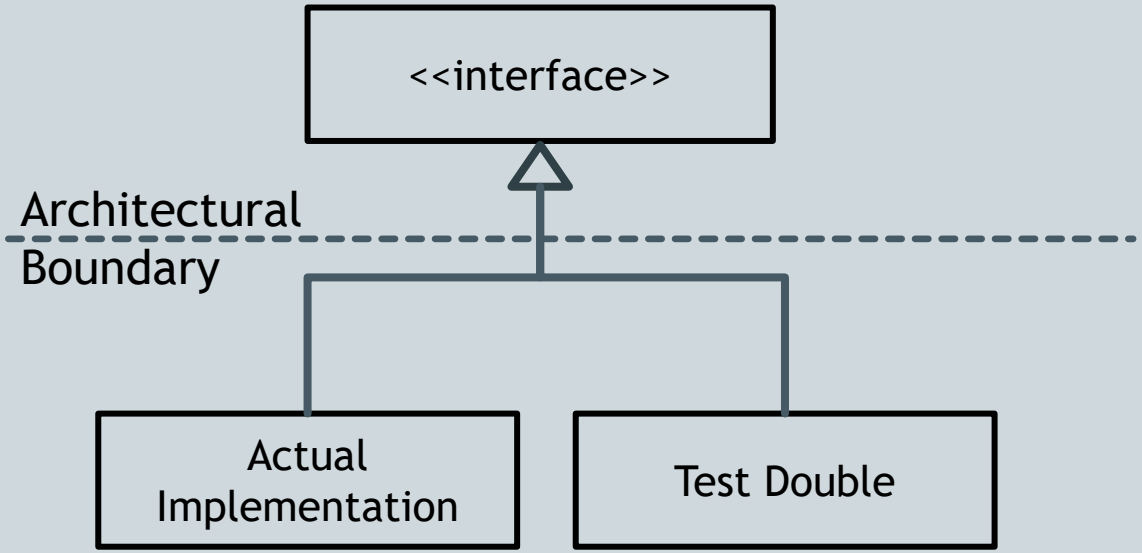




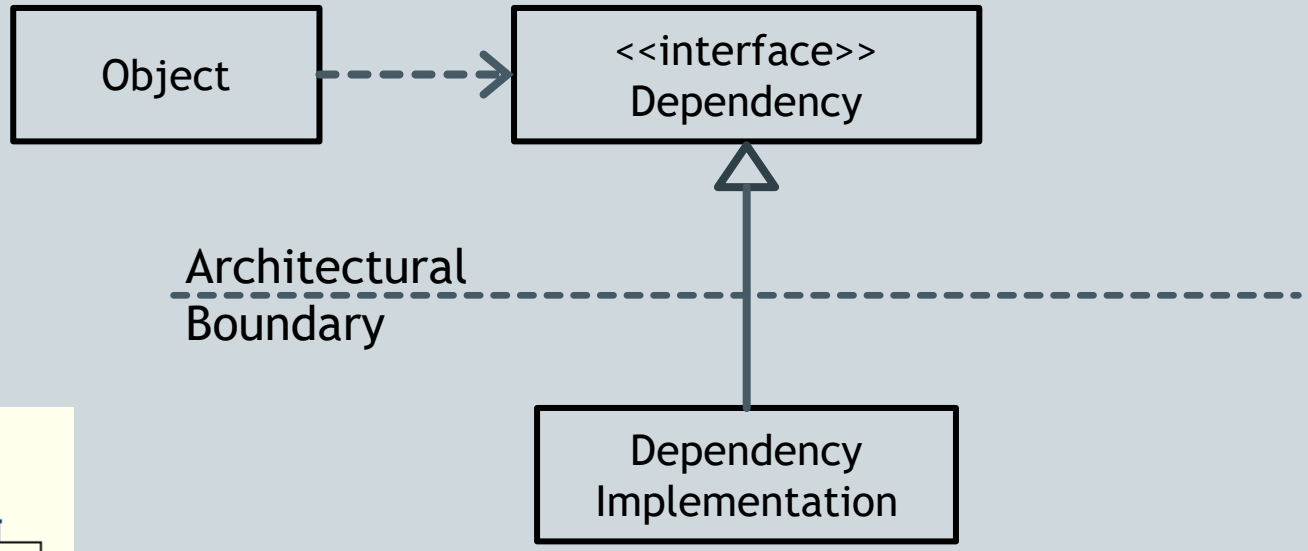
Example: Low Level Hardware

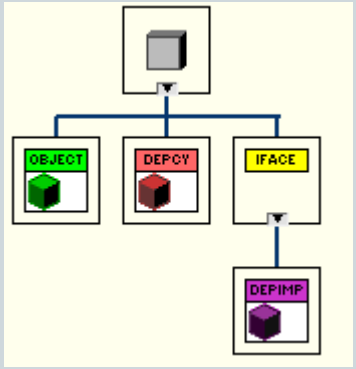


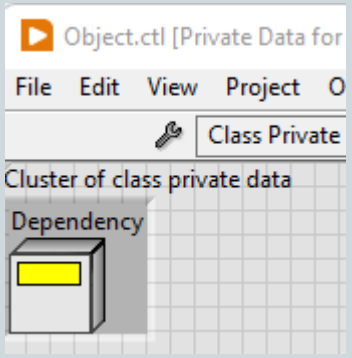
Test Doubles and Mock Objects

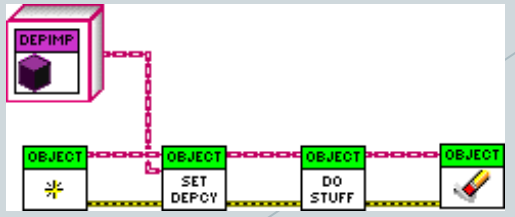


Dependency Injection









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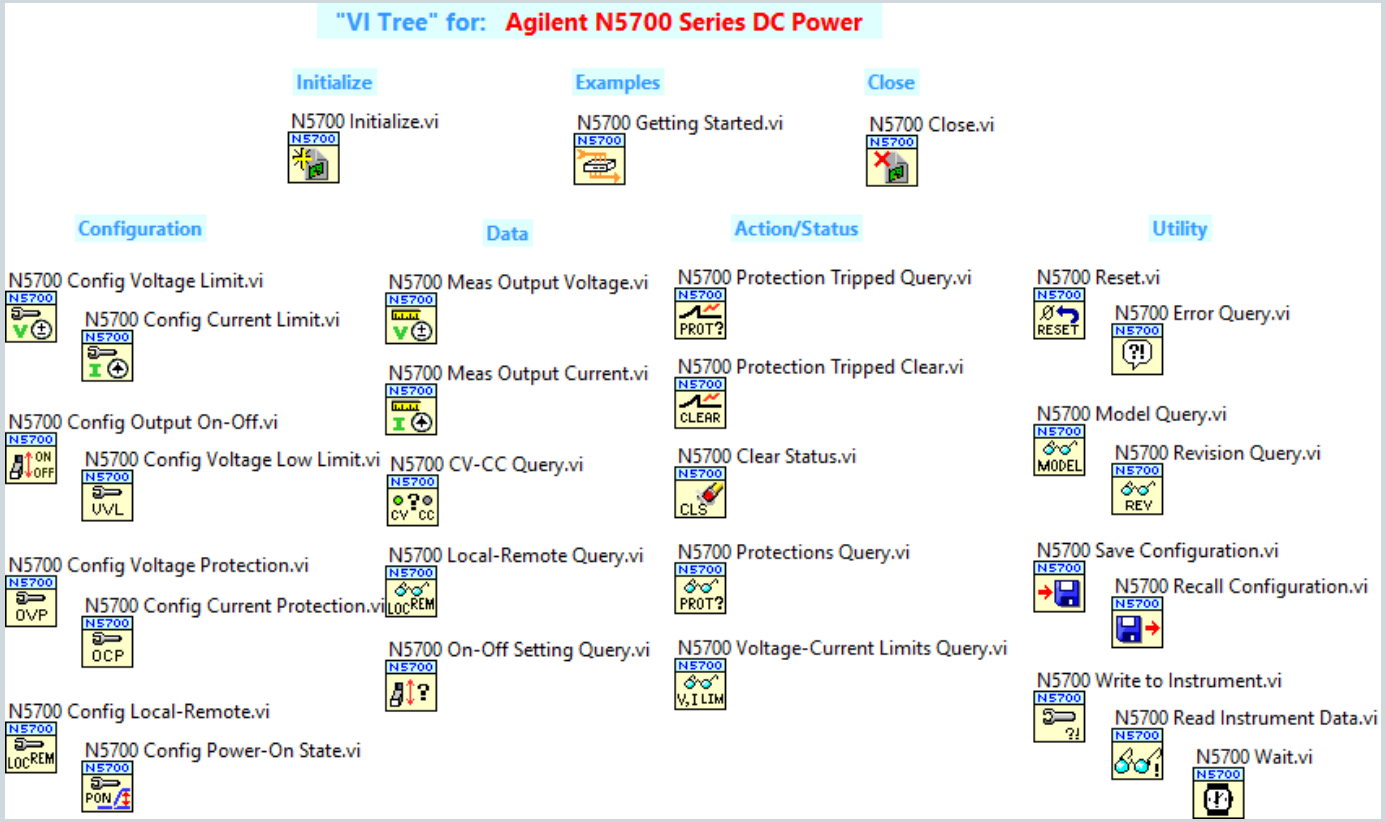
Example: High Level Hardware Drivers



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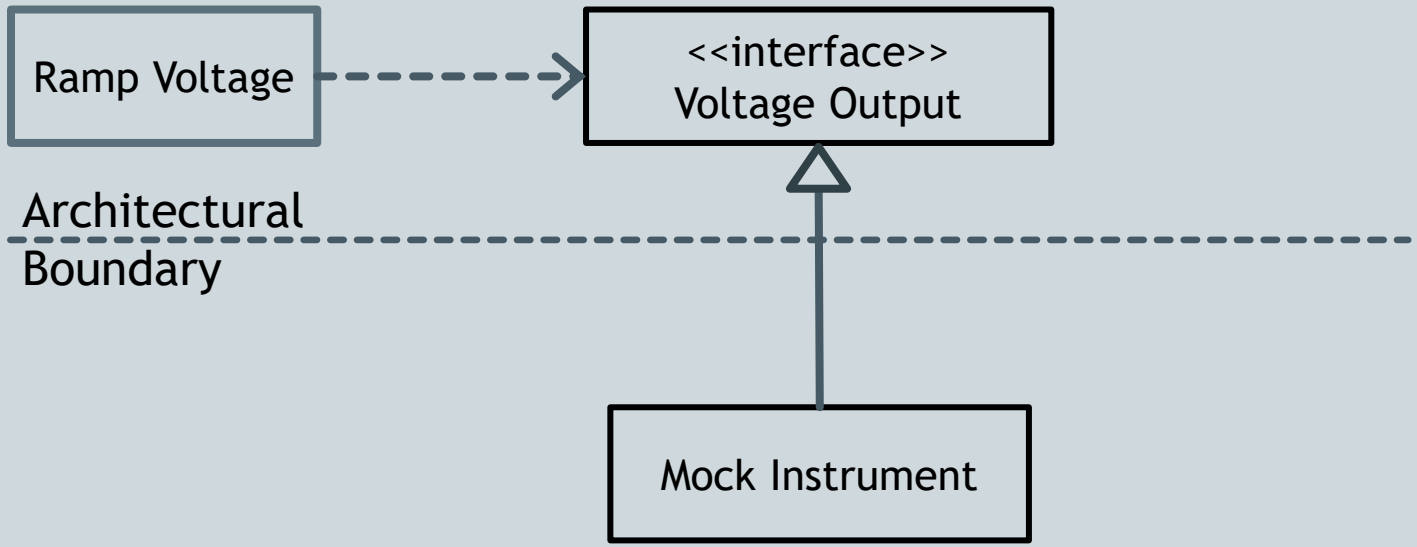
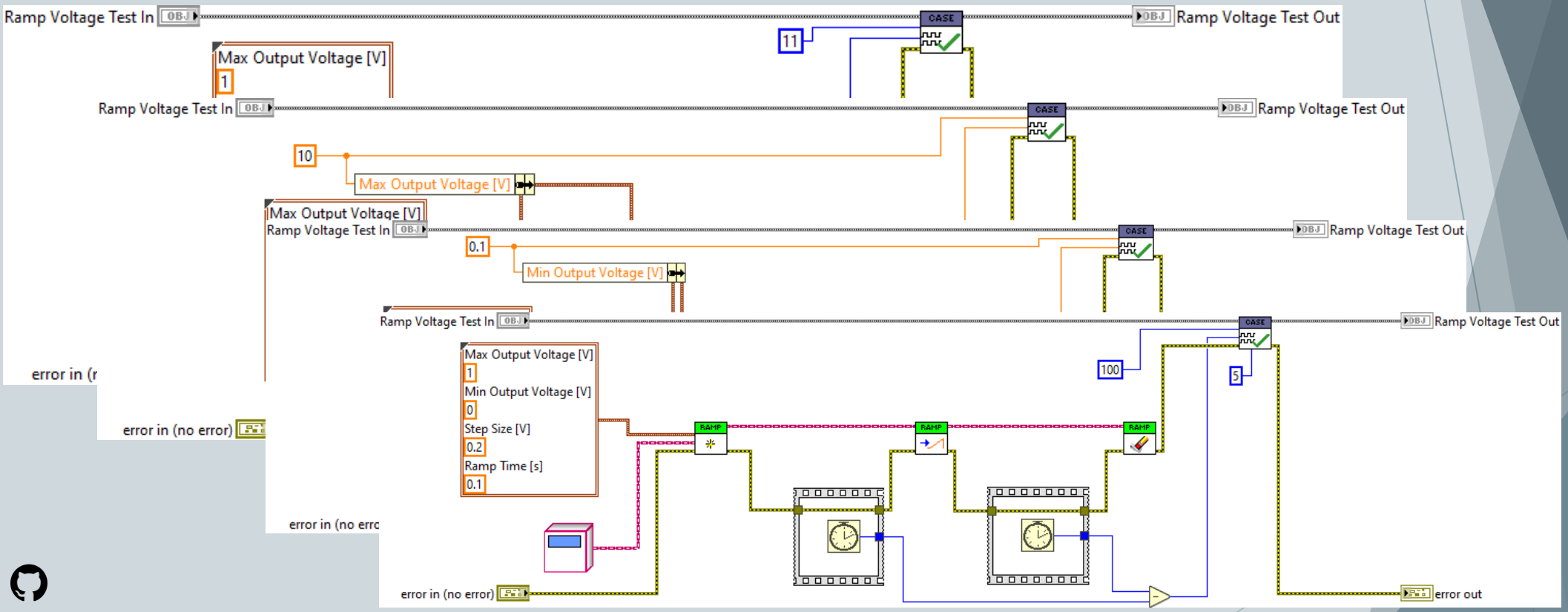
Higher Level Hardware



Testing Voltage Ramp



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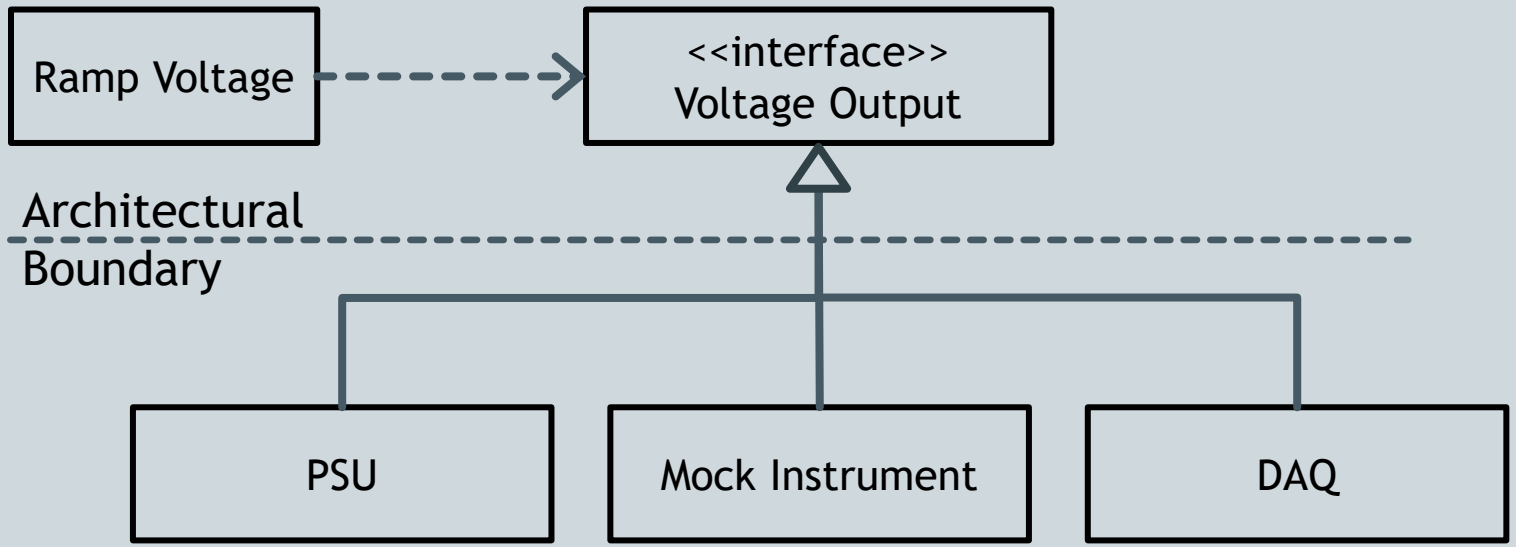
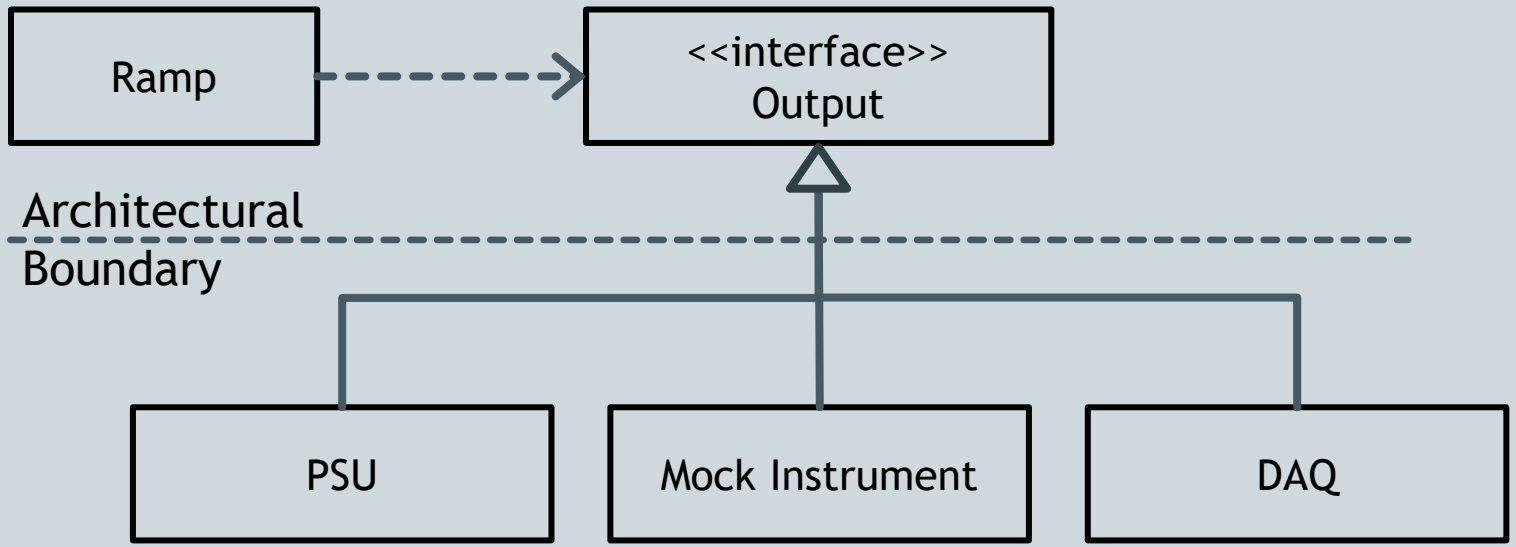
Higher Level Hardware



Level up!



Legacy Code

- “Legacy code is simply code without tests”

  – Michael C. Feathers, *Working Effectively with Legacy Code*

- “The Legacy Code Dilemma: When we change code, we should have tests in place. To put tests in place, we often have to change the code.”
- What have worked for me:
  - Always test new code
  - Gradually add tests to existing code
    - When refactoring
    - When changing
    - When fixing

Some useful practices

1. Keep user interfaces “dumb” (*i.e.* simple)
2. Don’t mary a framework
3. Only test private VIs through public interface
4. Use different compile and commit suites if test time gets painful
5. Test Behavior – not implementation
6. Always see test fail
7. “No production code before writing tests” – I often start with APIs
8. Avoid writing more than one test at a time
9. I rarely use manual Descriptions in assertions
10. Avoid testing more than one thing per test
11. Avoid complex setup/teardown
12. Running tests in parallel is useful
13. Using files for tests is ok – don’t prematurely optimize for speed

Questions?

- https://github.com/astemes/astemes-gdevcon-2022
  - Code
  - Presentation
  - Link to YouTube TDD Demonstration
- Reach me:
  - LinkedIN
  - During lunch
  - This evening

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