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Security Policy Presentation
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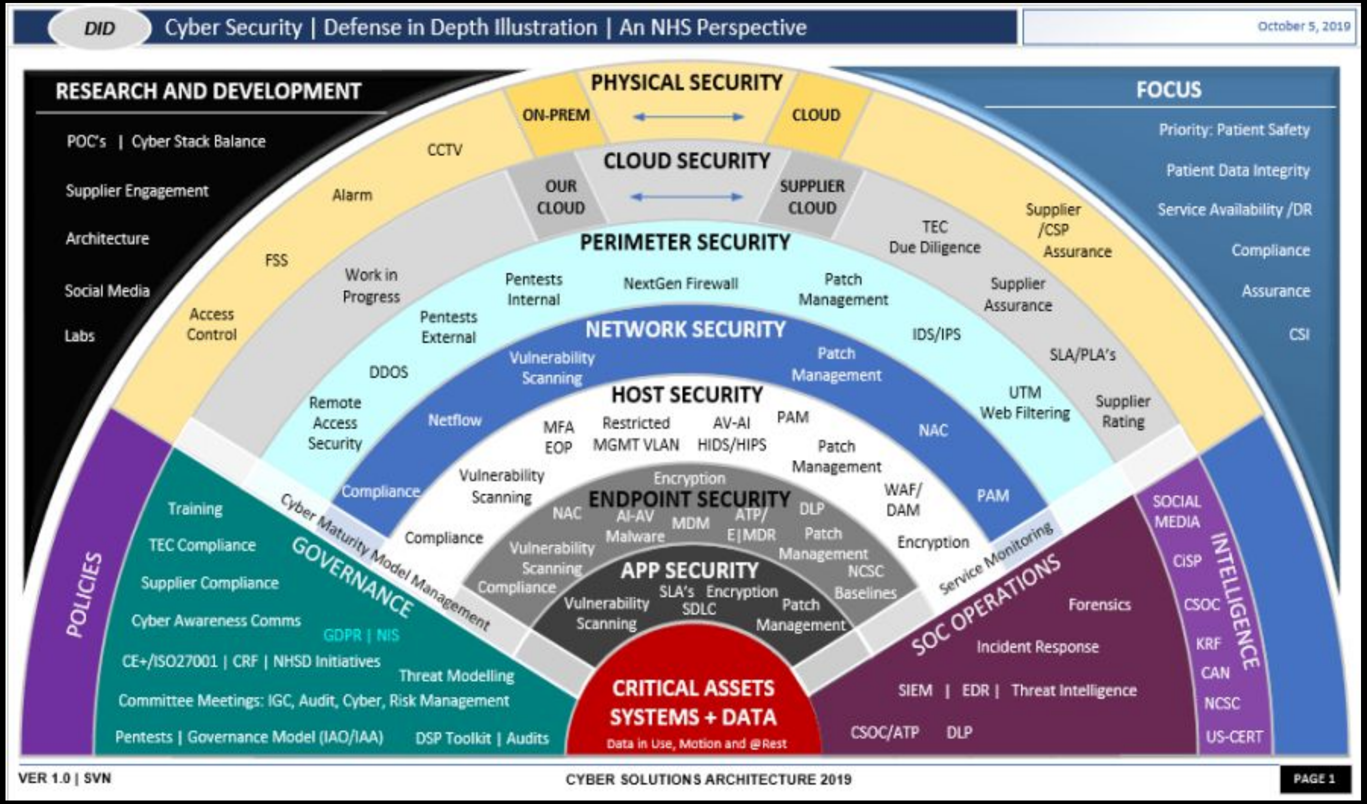
OVERVIEW: DEFENSE IN DEPTH



- Protect against common vulnerabilities
- Support defense-in-depth
- Consistent and maintainable
- SEI CERT C++ standards
- Protect against security breaches

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THREATS MATRIX

Rule	Severity	Likelihood	Remediation Cost	Priority	Level
STD-001-CPP	High	Likely	Low	High	4
STD-002-CPP	High	Likely	Low	High	4
STD-003-CPP	Medium	Unlikely	Low	Medium	3
STD-004-CPP	High	Unlikely	Low	High	4
STD-005-CPP	High	Unlikely	Medium	High	4
STD-006-CPP	Medium	Likely	Low	Medium	3
STD-007-CPP	Medium	Likely	Low	High	4
STD-008-CPP	High	Likely	Low	High	5
STD-009-CPP	High	Likely	Low	High	4
STD-010-CPP	Medium	Unlikely	Medium	Medium	3

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10 PRINCIPLES

- Validate Input Data – STD-009
- Heed Compiler Warnings – STD-006
- Architect for Security – STD-008
- Keep It Simple – STD-004, STD-006, STD-010
- Default Deny – STD-008
- Adhere to Standards – STD-001 to STD-010
- Sanitize Outputs – STD-009
- Practice Defense in Depth – STD-007
- Use QA Techniques – STD-007, STD-010
- Secure Defaults – STD-002, STD-003

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CODING STANDARDS

1. STD-008: Never Hard Code Secrets (Level 5)
2. STD-009: Format String Injection (Level 4)
3. STD-002: Validate Integers (Level 4)
4. STD-001: Avoid Integer Overflow (Level 4)
5. STD-005: Limit Pointer Arithmetic (Level 4)
6. STD-004: Array Bounds Check (Level 4)
7. STD-007: Handle Library Errors (Level 4)
8. STD-006: Non-Void Function Returns (Level 3)
9. STD-003: Implicit Type Conversions (Level 3)
10. STD-010: Avoid Signals in Threads (Level 3)

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ENCRYPTION POLICIES

- Encryption at rest
    - what it is
    - SHA-256 policy
    - how it applies
- Encryption in flight
    - what it is
    - HTTP and VPN policy
    - how it applies
- Encryption in use
    - what it is
    - secure environments
    - how it applies

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TRIPLE-A POLICIES

- Authentication
  - what it is
  - MFA policy
  - how it applies
- Authorization
  - what it is
  - role-based access policy
  - how it applies
- Accounting
  - what it is
  - tracking/logging policy
  - how it applies

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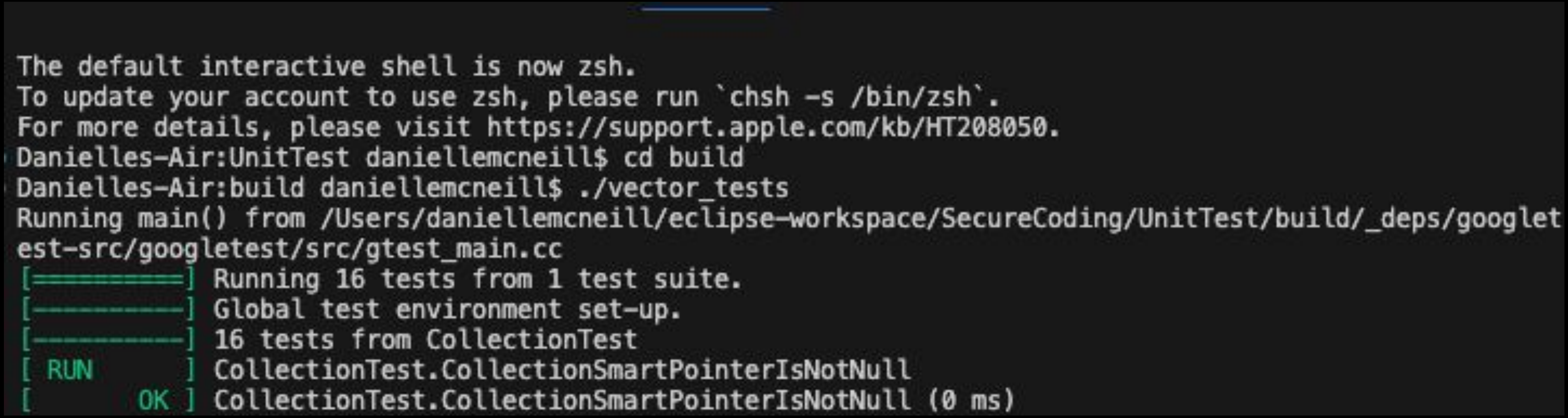
CollectionSmartPointerIsNotNull

- Positive test
- Passed
  - smart pointer is valid and not null



```
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
Danielles-Air:UnitTest daniellemcneill$ cd build
Danielles-Air:build daniellemcneill$ ./vector_tests
Running main() from /Users/daniellemcneill/eclipse-workspace/SecureCoding/UnitTest/build/_deps/googlet
est-src/googletest/src/gtest_main.cc
[==========] Running 16 tests from 1 test suite.
[----------] Global test environment set-up.
[----------] 16 tests from CollectionTest
[ RUN      ] CollectionTest.CollectionSmartPointerIsNotNull
[       OK ] CollectionTest.CollectionSmartPointerIsNotNull (0 ms)
```

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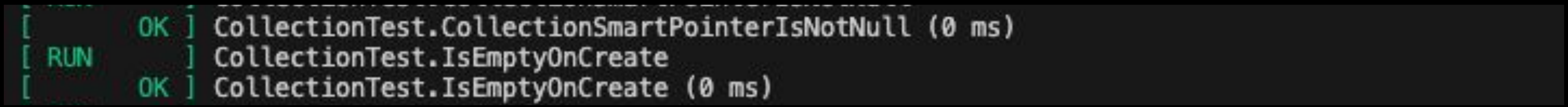
IsEmptyOnCreate

- Positive test
- Passed
  - vector is empty and has size 0



```
[       OK ] CollectionTest.CollectionSmartPointerIsNotNull (0 ms)
[ RUN      ] CollectionTest.IsEmptyOnCreate
[       OK ] CollectionTest.IsEmptyOnCreate (0 ms)
```

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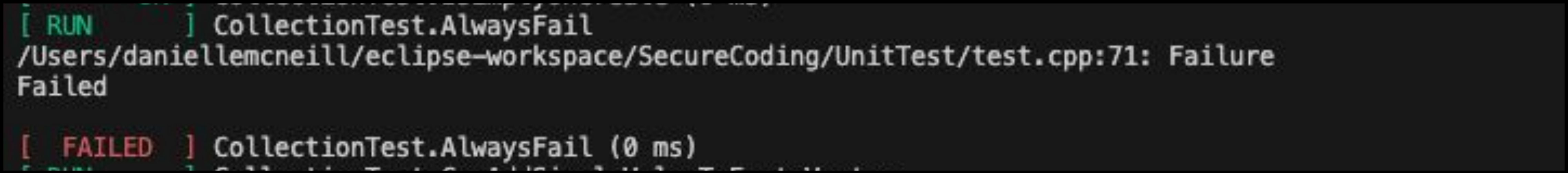
AlwaysFail

- Negative test
  - fails intentionally
  - confirms that the test is correct



```
[ RUN      ] CollectionTest.AlwaysFail
/Users/daniellemcneill/eclipse-workspace/SecureCoding/UnitTest/test.cpp:71: Failure
Failed

[  FAILED  ] CollectionTest.AlwaysFail (0 ms)
```

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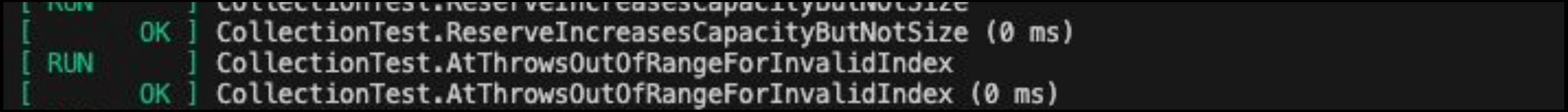
AtThrowsOutOfRangeForInvalidIndex

- Negative test
  - test passes only if out of range exception is thrown



```
[       OK ] CollectionTest.ReserveIncreasesCapacityButNotSize (0 ms)
[ RUN      ] CollectionTest.AtThrowsOutOfRangeForInvalidIndex
[       OK ] CollectionTest.AtThrowsOutOfRangeForInvalidIndex (0 ms)
```

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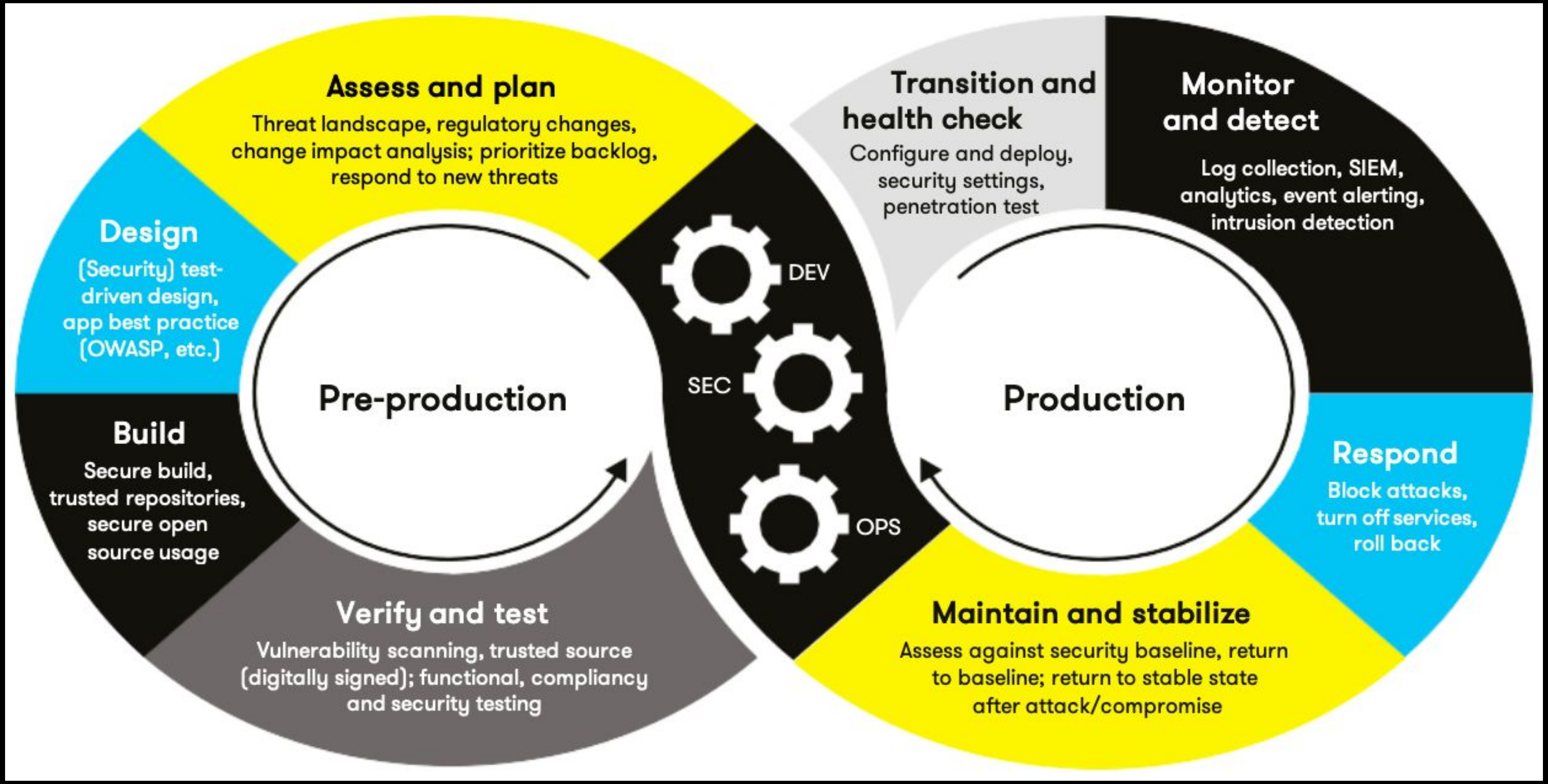
AUTOMATION SUMMARY


Assess and plan
Threat landscape, regulatory changes, change impact analysis; prioritize backlog, respond to new threats
Design
(Security) test-driven design, app best practice (OWASP, etc.)
Build
Secure build, trusted repositories, secure open source usage
Verify and test
Vulnerability scanning, trusted source (digitally signed); functional, compliancy and security testing
Pre-production
DEV
SEC
OPS
Transition and health check
Configure and deploy, security settings, penetration test
Monitor and detect
Log collection, SIEM, analytics, event alerting, intrusion detection
Production
Respond
Block attacks, turn off services, roll back
Maintain and stabilize
Assess against security baseline, return to baseline; return to stable state after attack/compromise

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TOOLS

- Assess & Plan
  - Cppcheck
- Design
  - Secure architecture
- Build
  - Cppcheck, Clang++
- Test
  - Unit tests
- Deploy
  - Fortify
- Monitor
  - Logging frameworks
- Maintain
  - Update policies and tools regularly

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RISKS AND BENEFITS

- Waiting
  - vulnerabilities go undetected
  - inconsistent coding
  - higher cost
  - increased security risk
- Act Now
  - enforce SEI CERT standards
  - Integrate security at the start
  - catch and correct problems early
  - maintain consistency
- Risks vs. benefits
  - increased debt, more risk of attack, reactive policy
  - lower cost, stronger protections, proactive policy

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RECOMMENDATIONS

- Close existing gaps in memory safety and privilege access
- Enforce standard adoption through CI pipelines
- Expand testing coverage and automation
- Monitor compliance continuously

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CONCLUSIONS

- Add secure logging standards
- Integrate container security checks
- Expand coverage to third-party libraries
- Introduce policies for zero-trust environments

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REFERENCES

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