MATLAB EXPO

코드 검증을 위한 Continuous Integration 활용 방안

유용출, MathWorks Korea

MathWorks®

Agenda

- Polyspace Products for Static Analysis
- Polyspace in Continuous Integration (CI)
- Automate Polyspace Static Analysis by Continuous Integration Tool
- Collaborative Review Environment with Polyspace and 3rd Party Tool

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- **Polyspace Products for Static Analysis**
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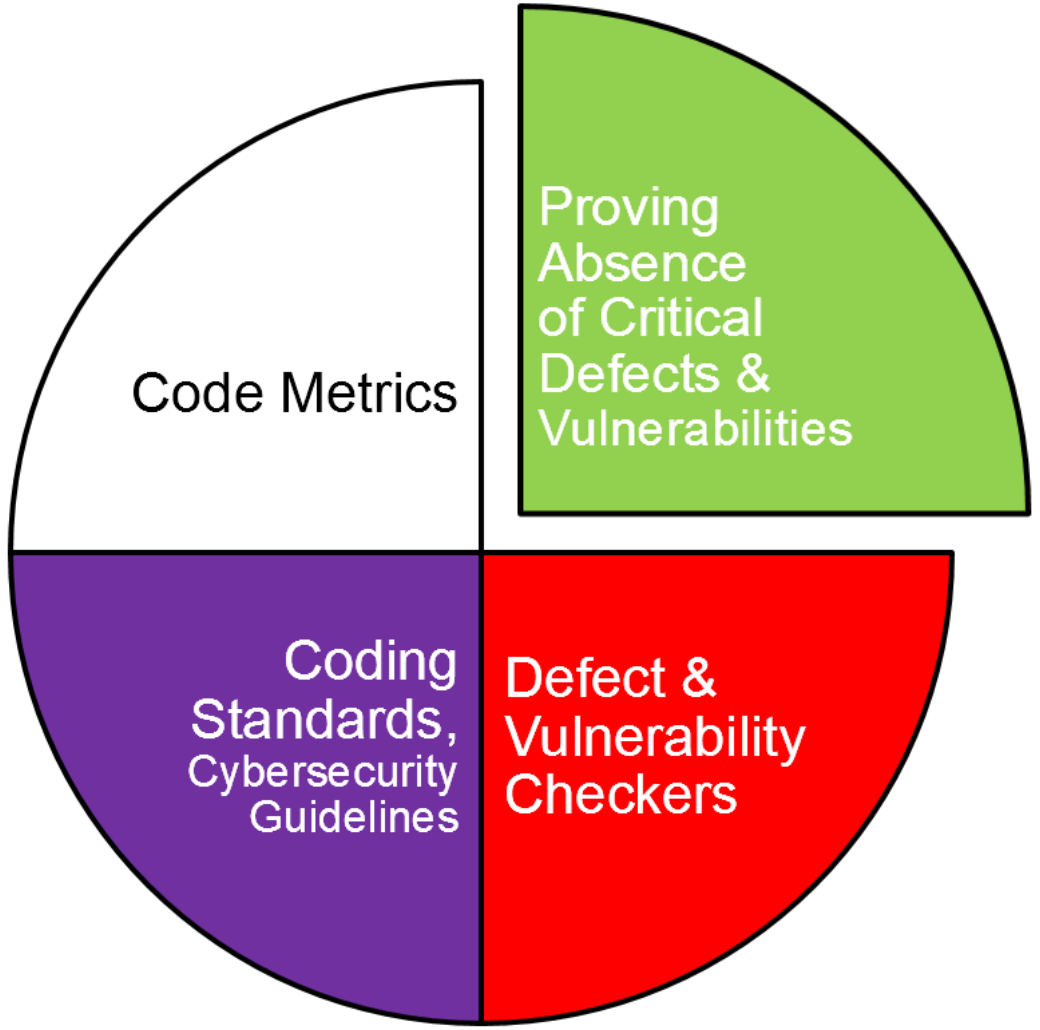
Polyspace Tools

Bug Finder

- Produce code metrics
- Check coding standards
- Find defects and vulnerabilities

Code Prover

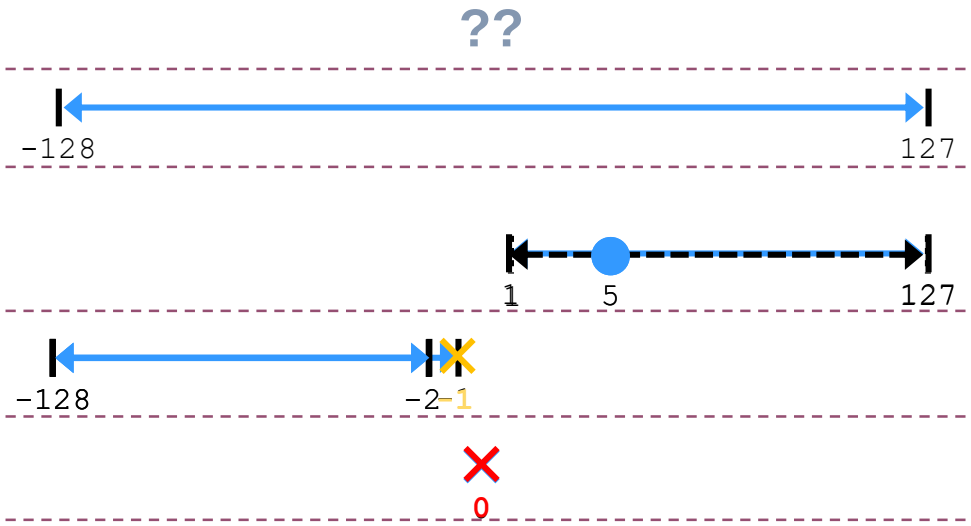
- Proves code Safe and Secure
- 33 most critical run-time checks
- Supports DO-178 and ISO 26262 mor



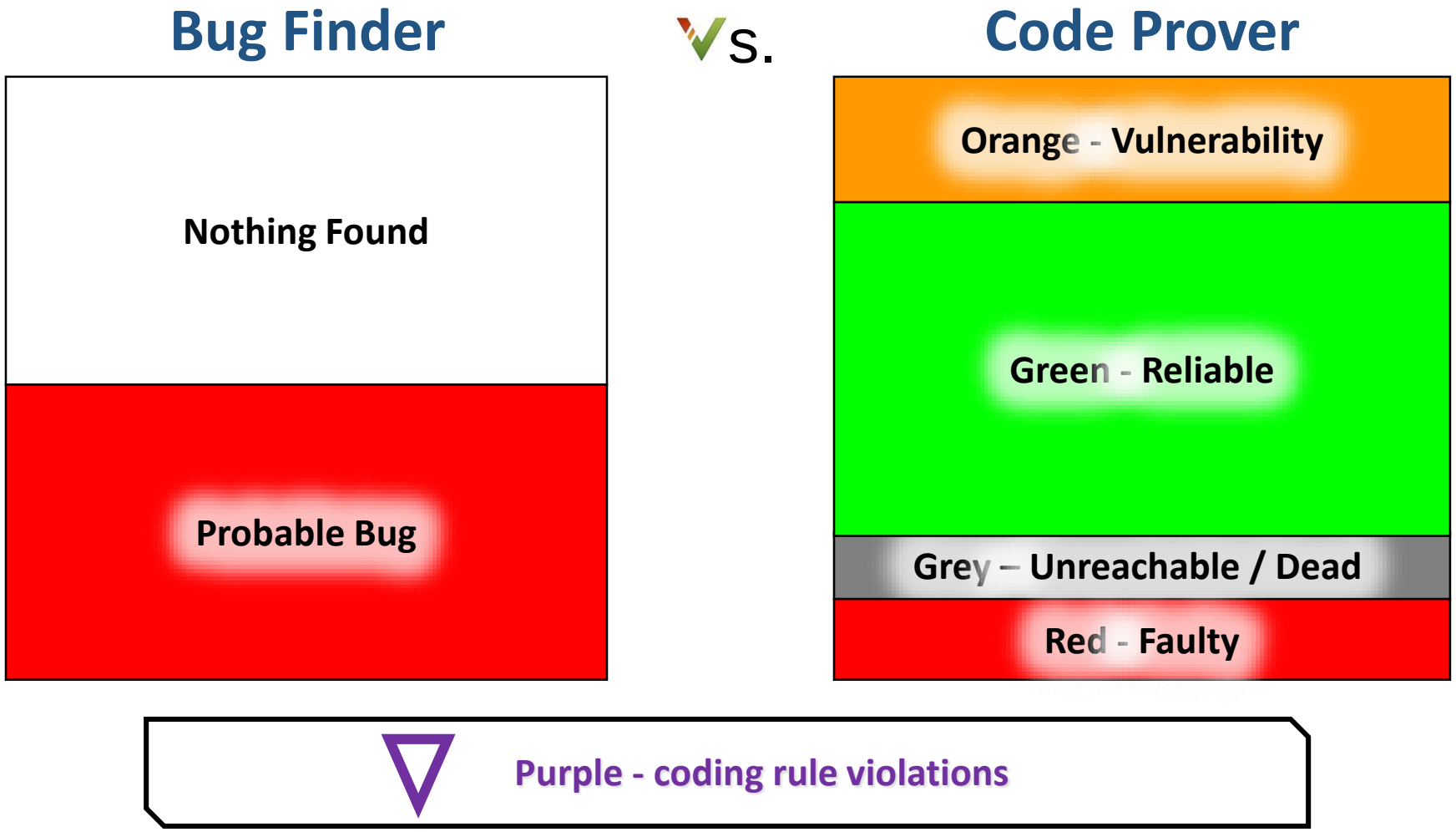
Formal Methods Prove Absence of Runtime Errors in your SW

- To prove the absence of errors, the Polyspace verification accounts for all possible execution paths using abstract interpretation.

```
signed char x, y;

x = random_char();

if (x > 0) {
    x = 5;
} else if (x != 0){
    y = 100 / (x + 1);
} else {
    y = 200 / x;
}

printf("%d",x);
```



How do Bug Finder results differ from Code Prover results?



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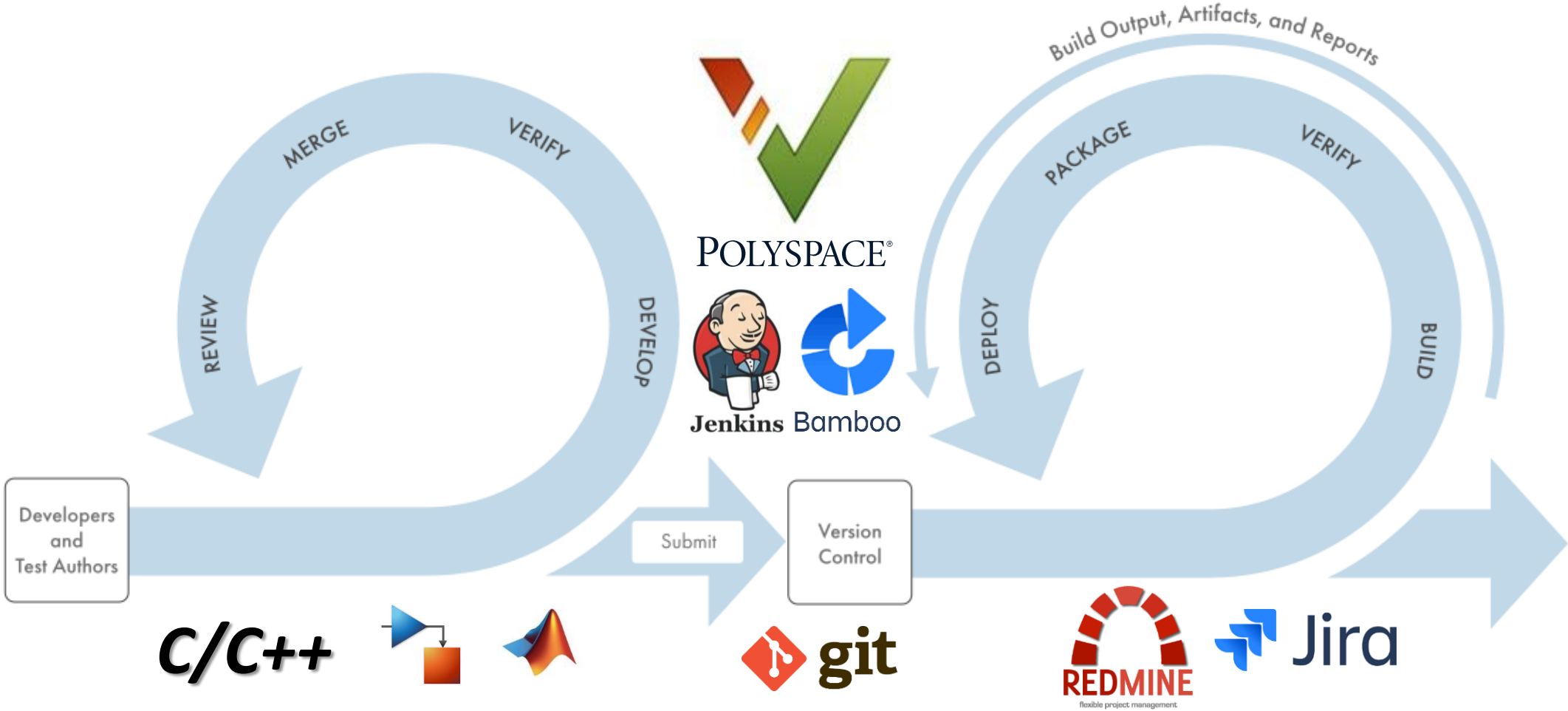
Continuous Integration (CI)



Common Questions to Adopt Polyspace in Continuous Integration

- ✓Who manages multiple servers?
- ✓No time to invest in static analysis?
- ✓How to manage so many issues?
- ✓How to configure analysis jobs in CI?
- ✓How to share analysis results?

Common Questions to Adopt Polyspace in Continuous Integration

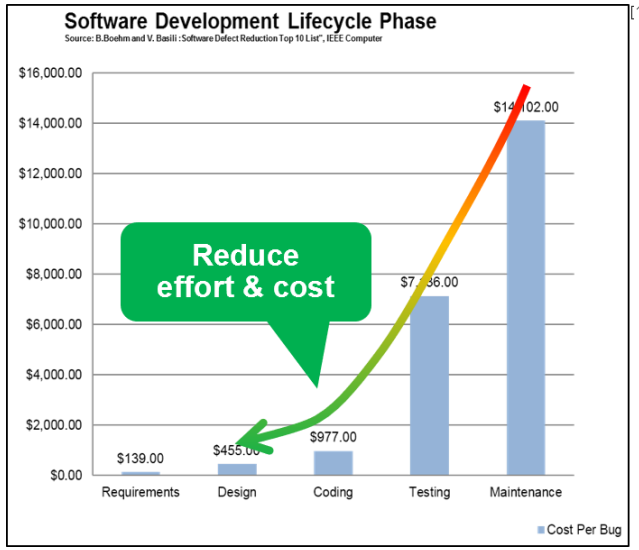
- Who manages multiple servers?
- How to share analysis results?

Technical Difficulties

Cost

Resolve Challenges to Adopt Polyspace in Continuous Integration

- Abundant information helps to lower technical hurdle
  - Youtube, Blogs, Articles and open communities in the internet
  - 3rd party tools provide plugins and guidelines
- CI and Static Analysis helps cost reduction



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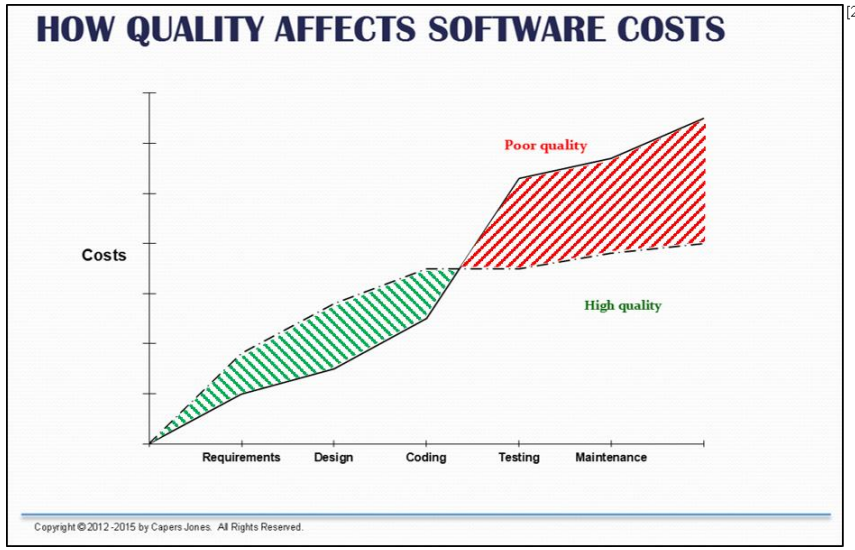

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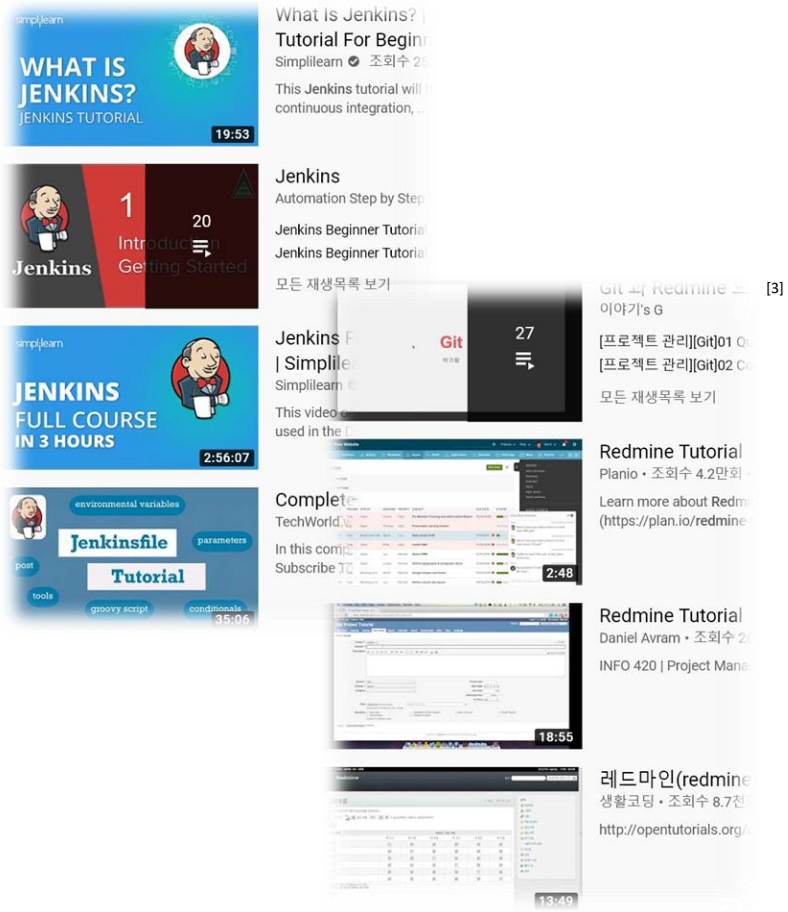

[3]

[1] Barry Bohem, “Software Defect Reduction Top 10 List”, IEEE
[2] Capers Jones, “Software Quality in 2016: A Survey of the state of the art”
[3] captured from Youtube

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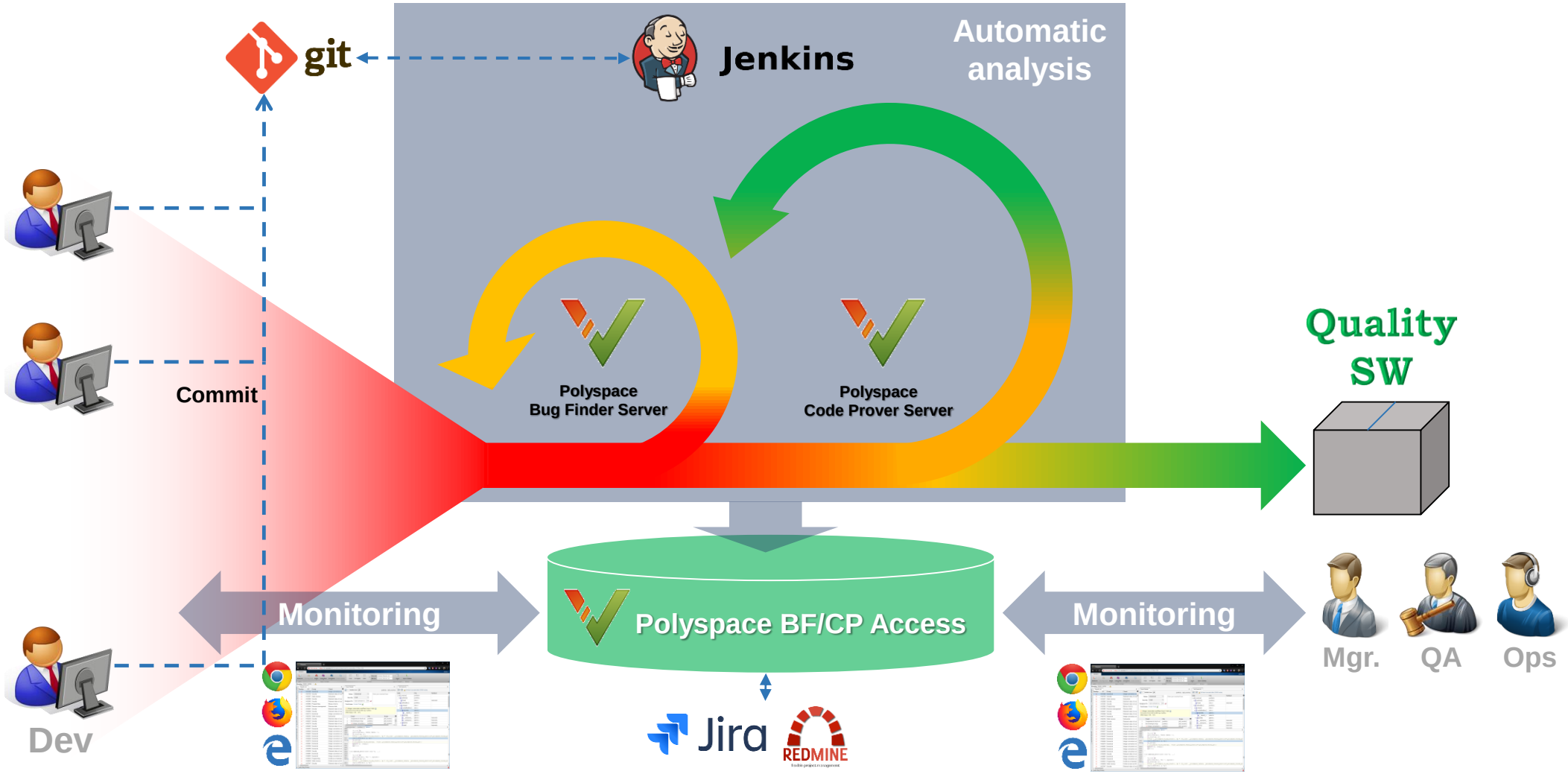
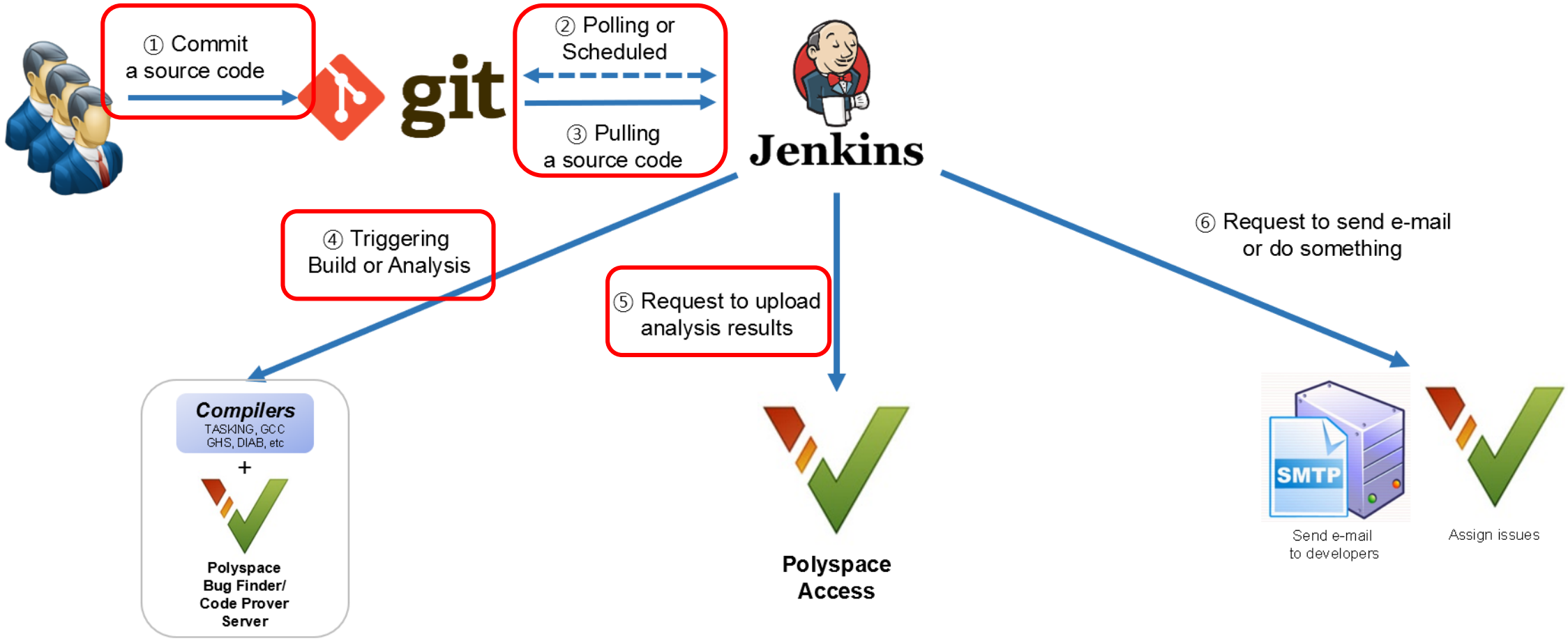
Automatic Polyspace Analysis after Commit and Review Environment



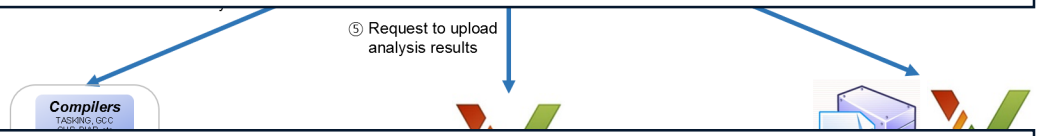
CI tools can automate Polyspace analysis job



Configure for Source Code Repository and Triggers

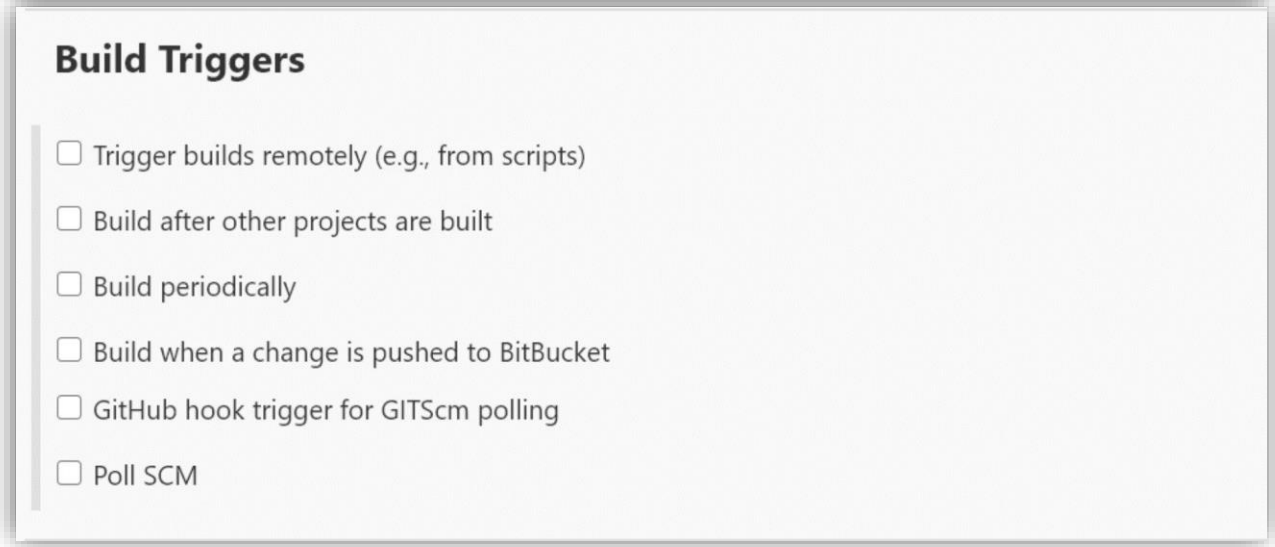
Configure for source code management

- Source code repository type
- Account information
- Branch



Usually, configure for triggers

- Analyze periodically
- Analyze when source codes are changed



Start Static Analysis after Pulling Source Code and Upload the Result

Configure commands for analysis

- Project creation
- Analysis option configuration
- Analysis for source codes

Configure commands to upload

- Project creation for the web interface
- Upload analysis results
- Assign results to owners

Execute shell

Command

```
#Clean project
make clean

#Create a proejct automaticaly from build command
polyspace-configure -allow-overwrite -allow-build-error -prog "BF_Resu

#Run Polyspace Bug Finder
polyspace-bug-finder-server -options-file "BF_Result.psopts" -options-
```

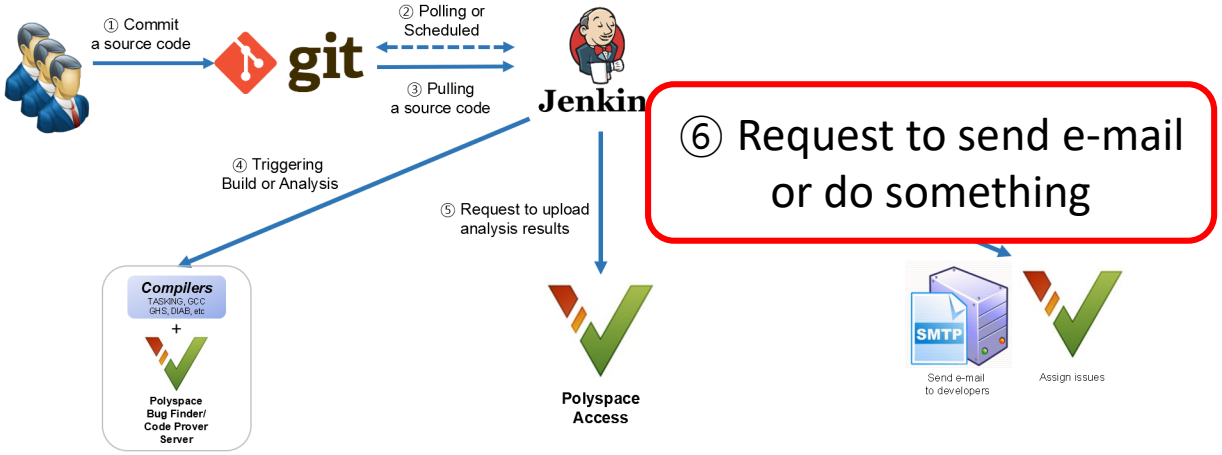
Just 7 ~ 8 lines

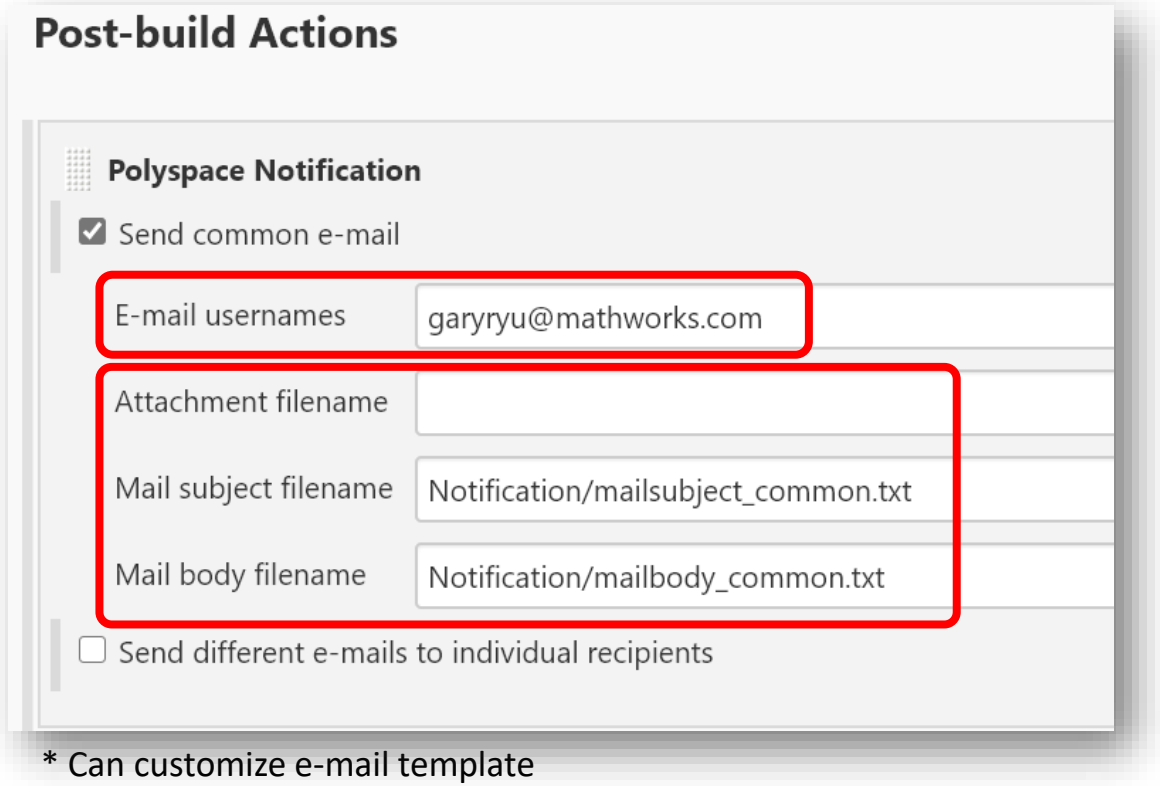
Command

```
#Create project folders on Polyspace Access
$ps_helper_access -create-project "Team1"
$ps_helper_access -create-project "Team1/Project1"

#Upload a result to Polyspace Access
mkdir Notification
$ps_helper_access -upload ./BF_Result/ -project "BF_Result" -parent-pr

#Assign owners to unassigned issues
$ps_helper_access -set-unassigned-findings "Team1/Project1/BF_Result"
```

See the list of available environment variables

Send an E-mail about Summarized Information





* Can customize e-mail template

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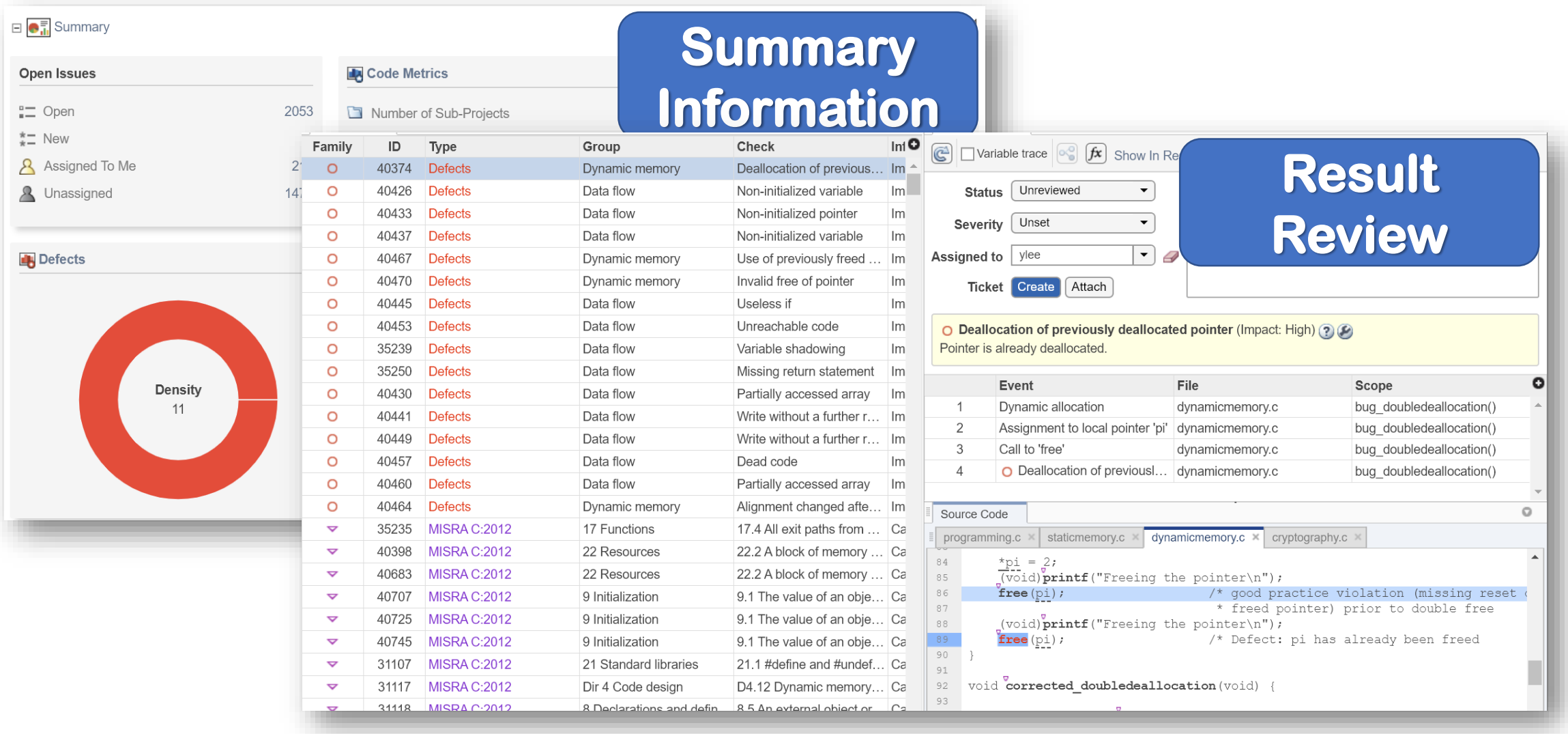
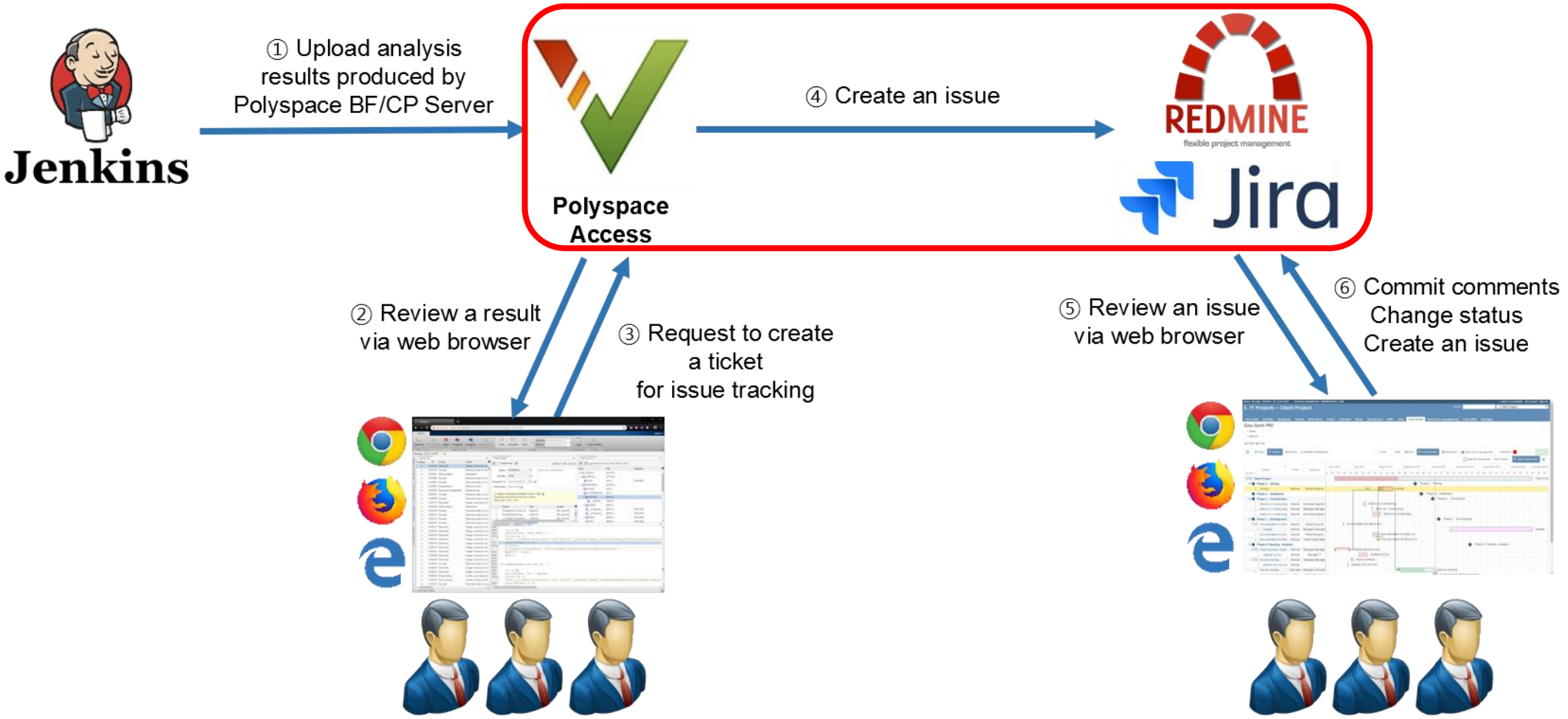
Polyspace Access - Web Interface for Collaborative Review



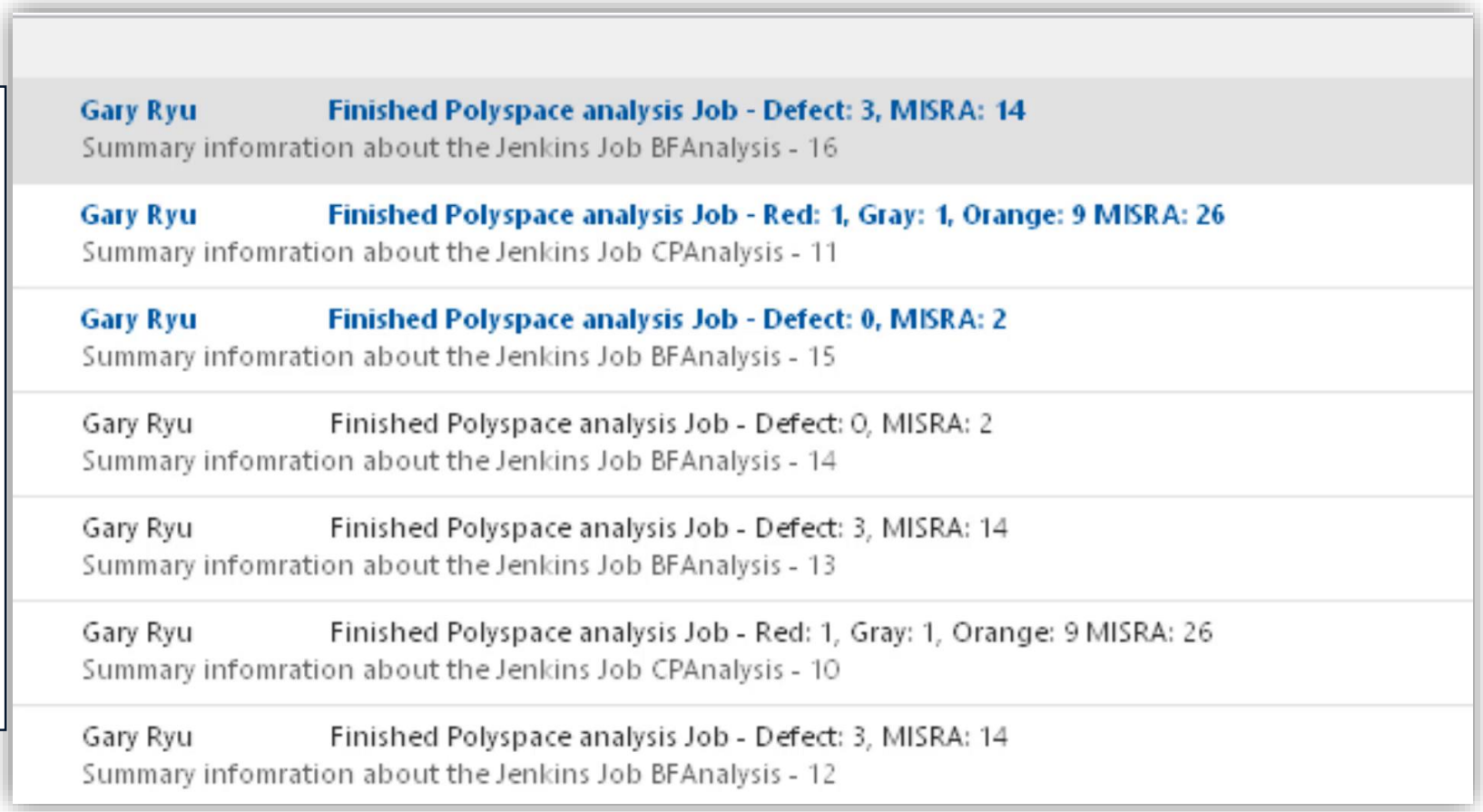
Collaborative Review Environment



Open Analysis Result from E-mail

Email can provide …

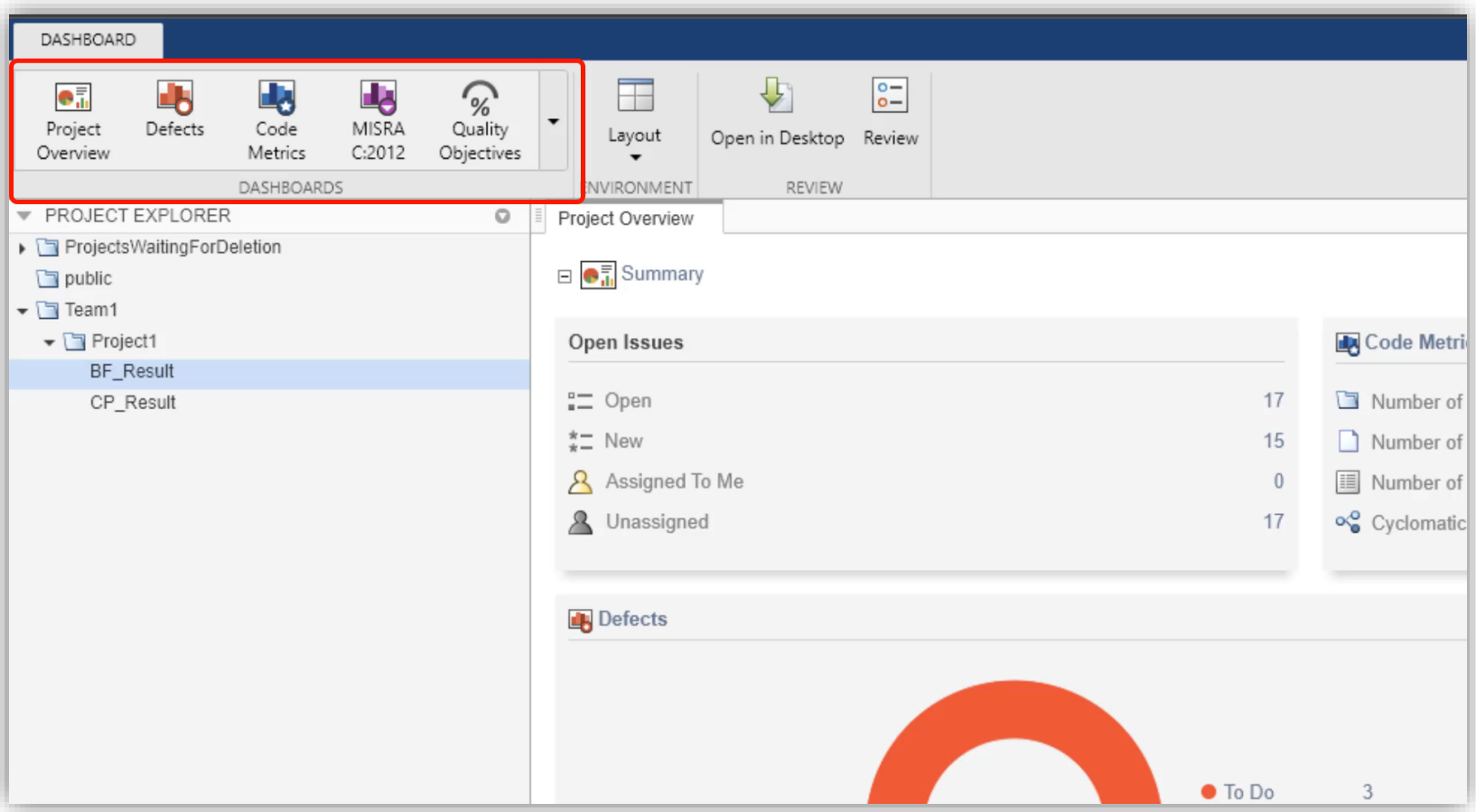
- Alarm about completion status
- Brief information about analysis result
- Links to analysis results



Easy to Understand Overall Polyspace Analysis Results

Dashboards provide …

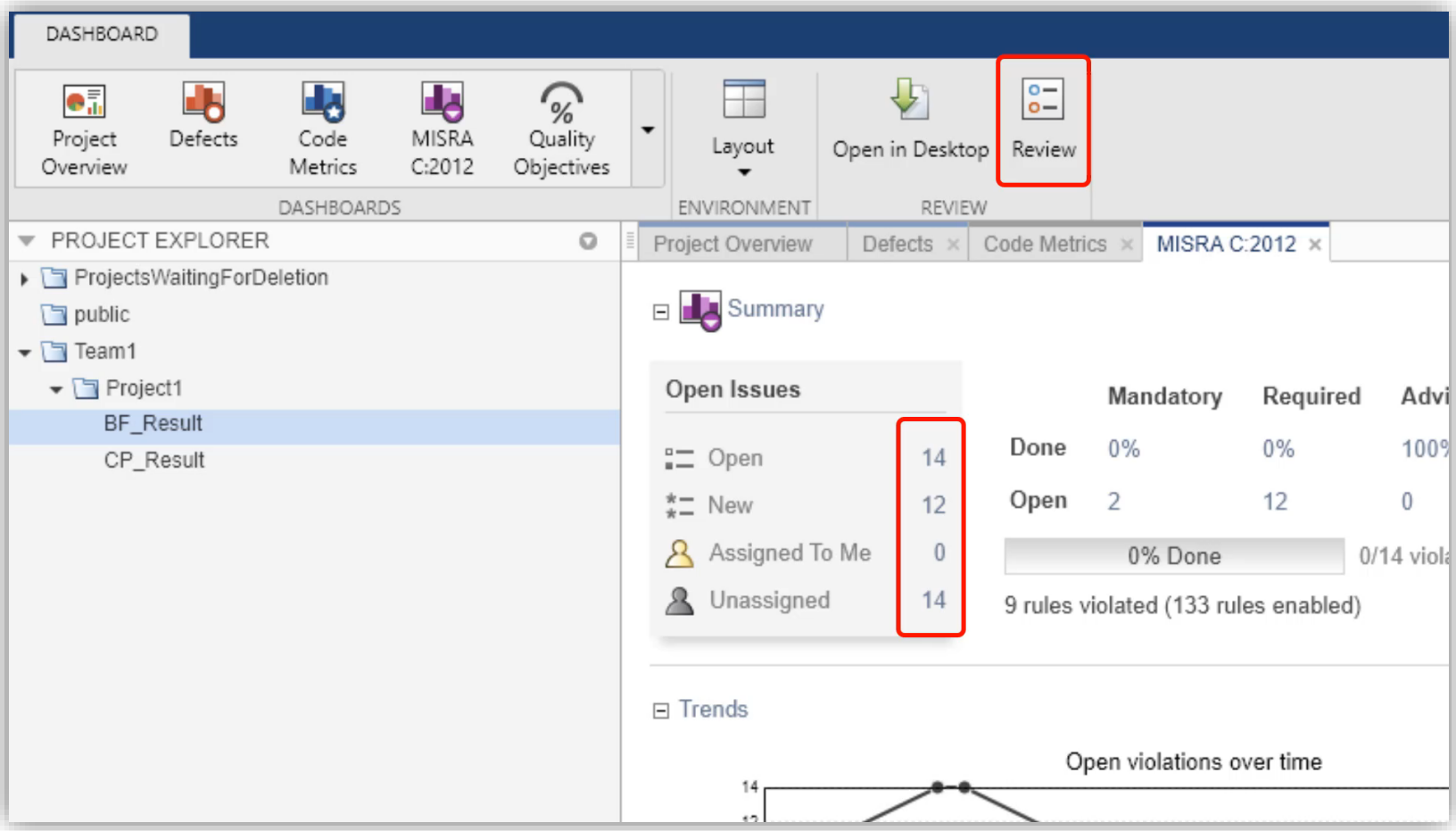
- Overview of analysis results
- Graphical charts
- Clickable fields to drill down into findings



Collaborative Review Environment

Result Review provide …

- Results List
- Result Details
- Source Code
- Call Hierarchy
- Various Filters
- Review Comments
- Issue Assignment
- Ticket Creation to Issue Tracking Tool



Issue Tracking between Polyspace Access and 3rd Party Tools

Result Review provide …

- Results List
- Result Details
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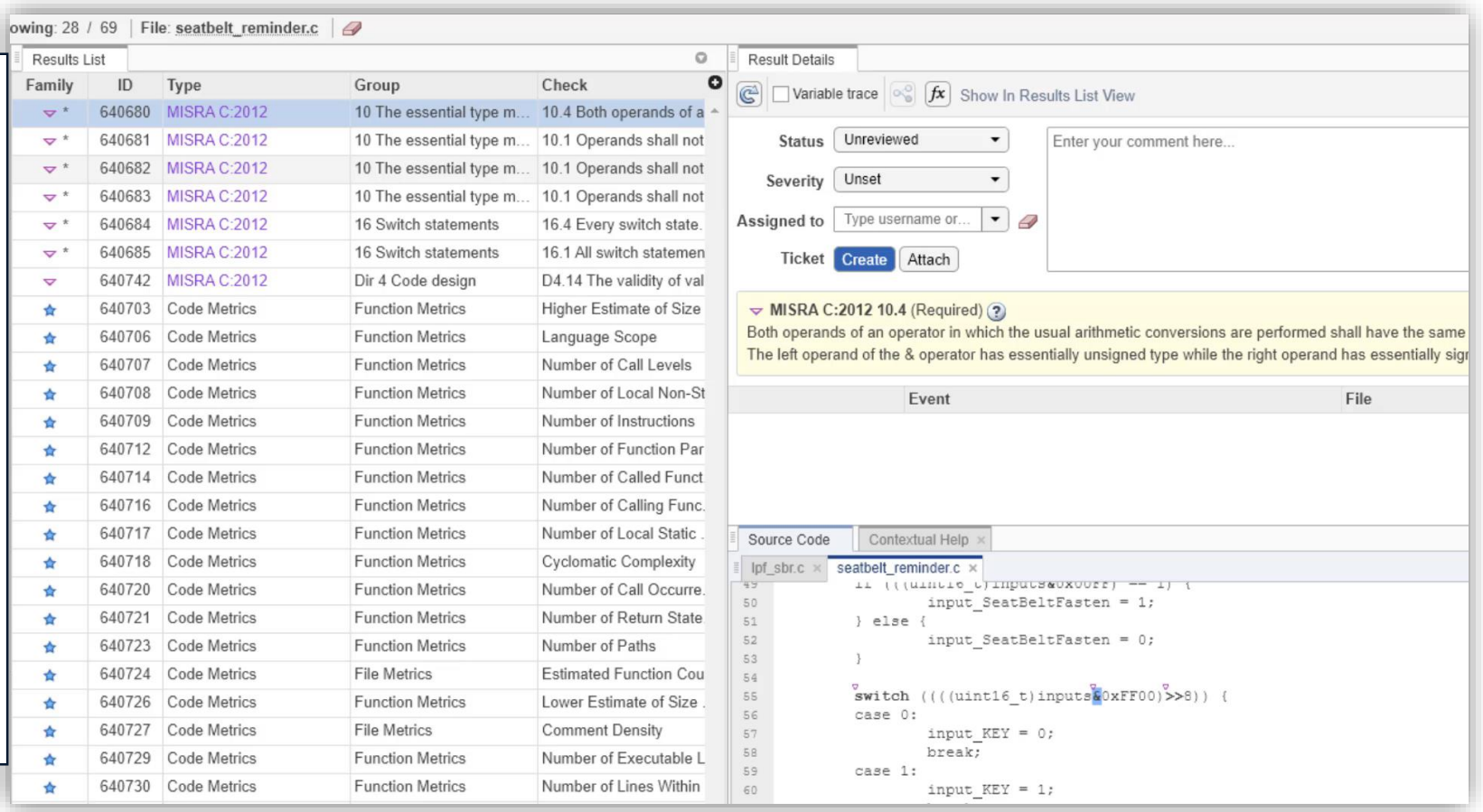
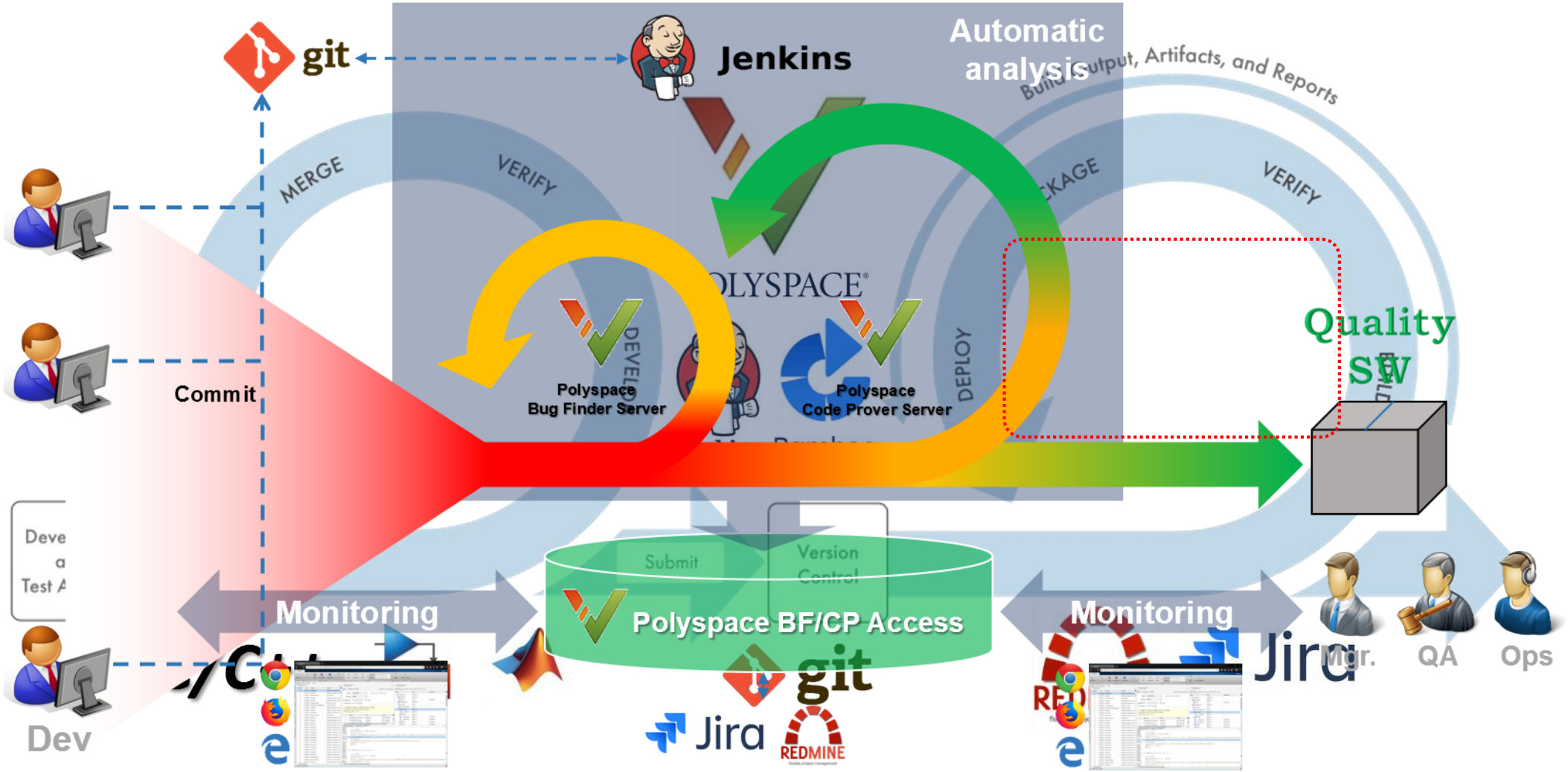
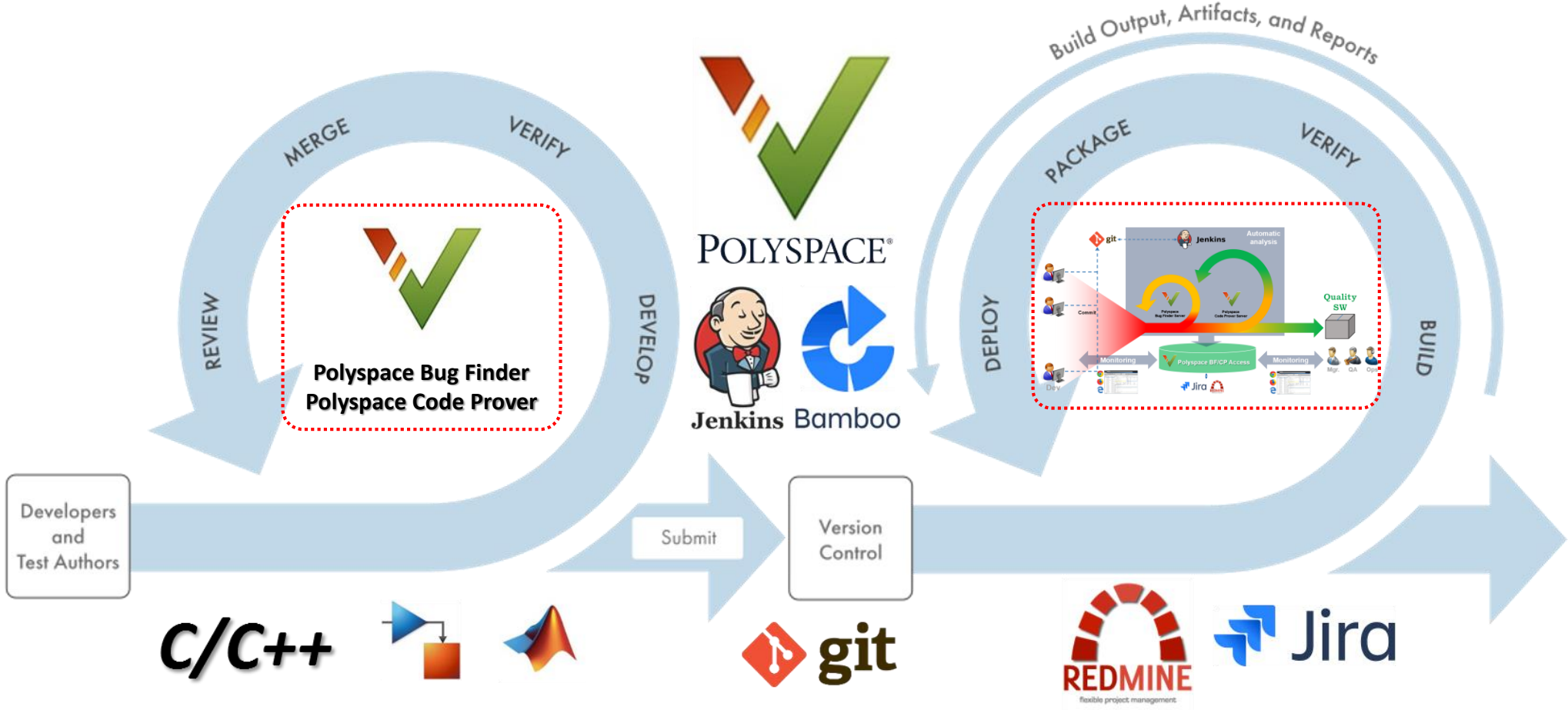


Polyspace in Continuous Integration (CI)



Completed Workflow for Static Analysis with Polyspace



https://kr.mathworks.com/videos/code-verification-for-cc-with-polyspace-121361.html

Thank You !!