

Accelerating Debug with Experience-Driven Insights: A Tool-Based Approach for IP and SoC-Level Verification

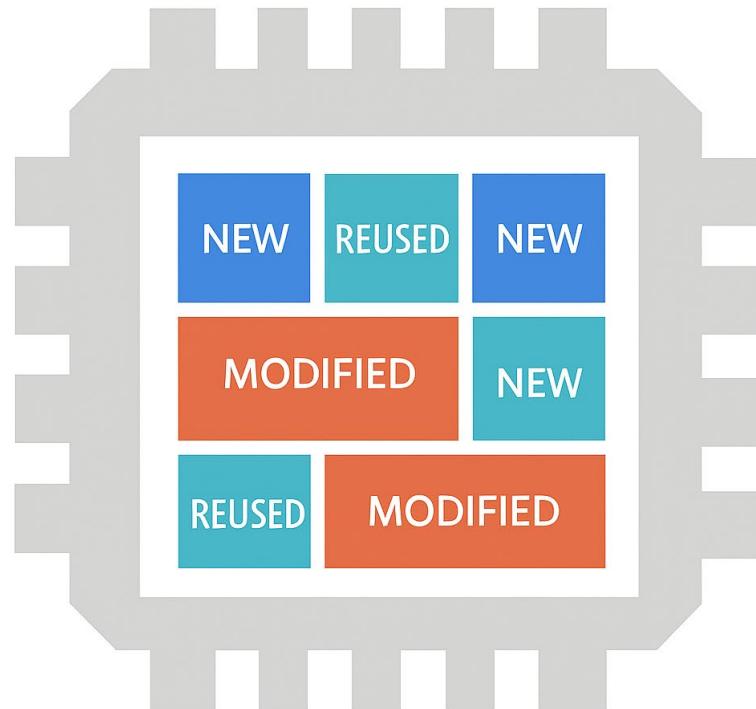
Maitreyi Vemulapalli

Vinay Datta

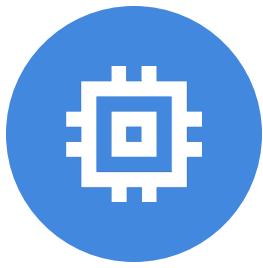


Design blocks in typical SoCs

- 60–70% -reused or modified blocks.
- 30–40% -new blocks.



Verification Challenges



Complex
SoCs



Long
runtimes



Debug



Coverage
closure

Verification of modified IPs

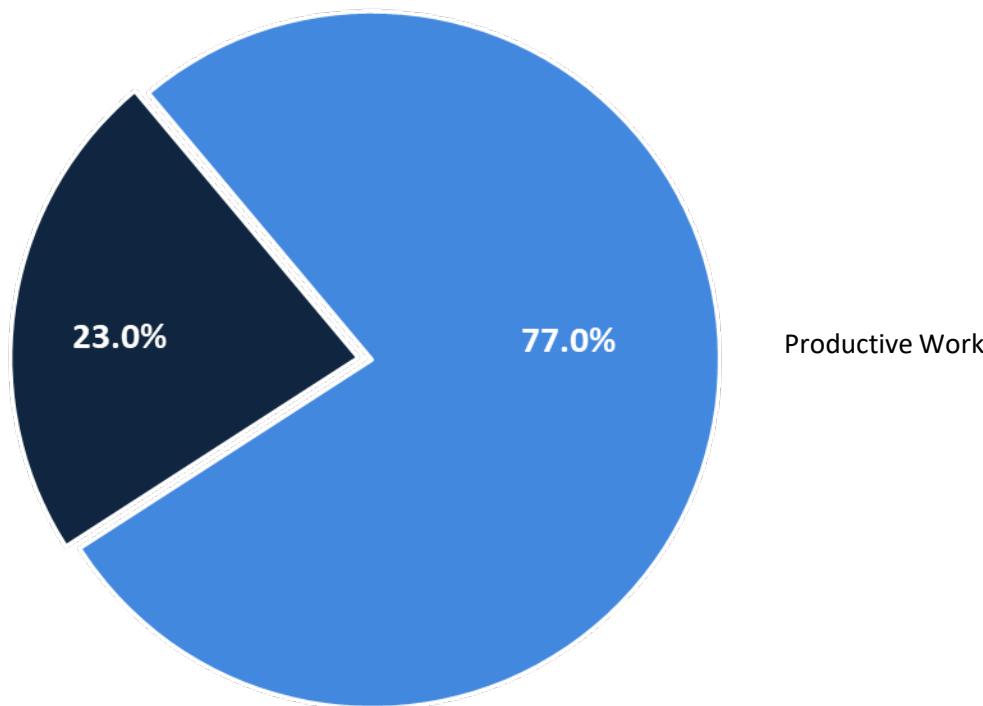
- Highly underrated task !
- New engineers face a steep learning curve

Statistics

Engineering Time Distribution (CoLab Research)

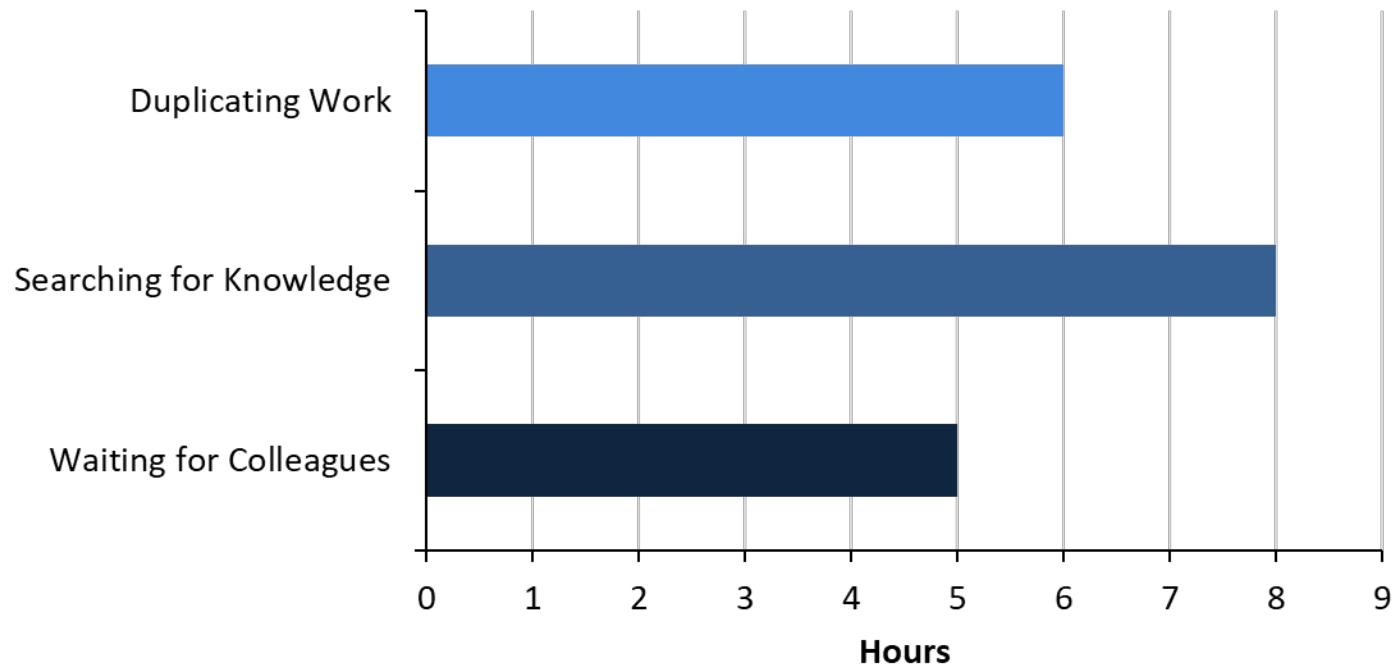
Non-Value Added Work:

- Waiting for feedback or next steps.
- Tracking down issues buried in emails or chats.
- Attending unproductive meetings



Statistics..

Panopto Survey: Time Lost per Week Due to Knowledge Inefficiencies



Problem

DEPENDENCY

Traditional solutions

- Messaging platforms – slack
- Documents
- Ewikis
- Bugtracking tools - Jira

Traditional solutions..

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**UNSTRUCTURED,
HARD-TO-SCALE**

Solution

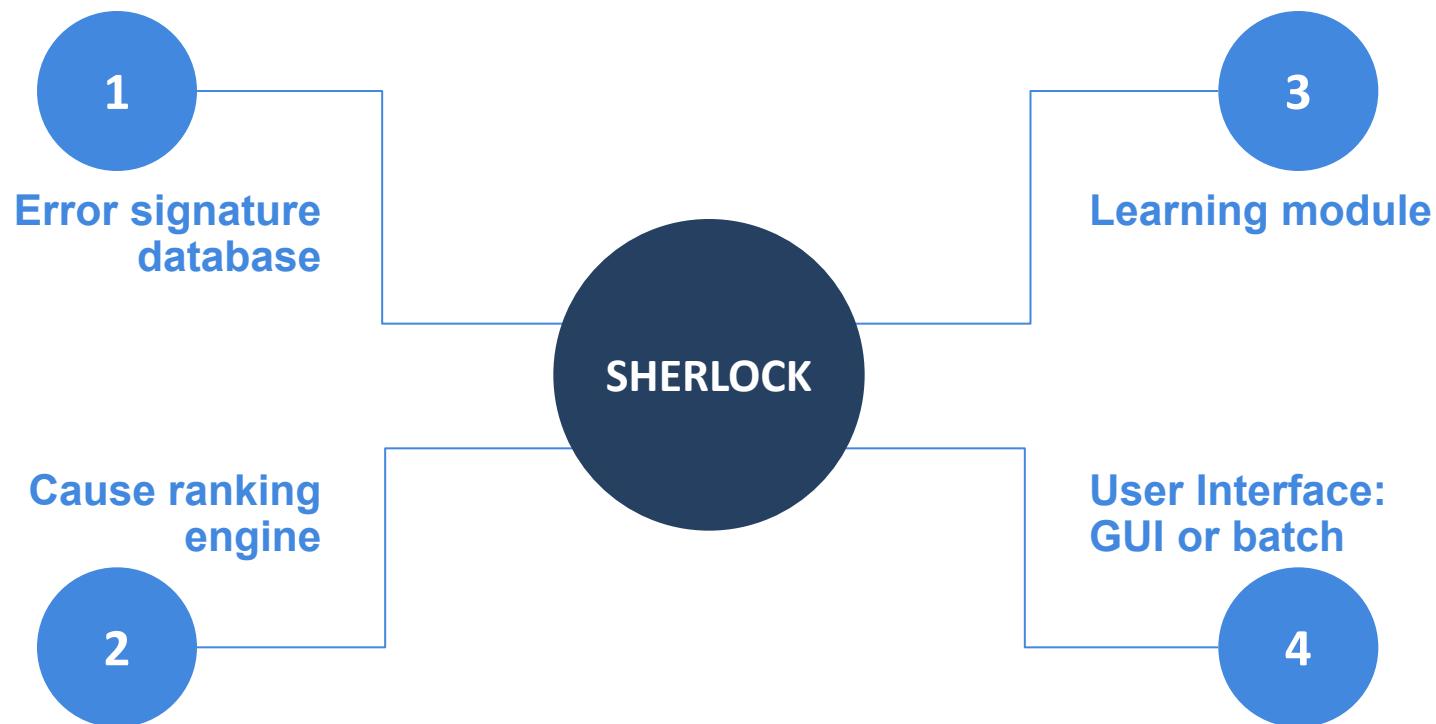
- A tool that captures and reuses debug-knowledge via error signatures and likely root-causes

Solution..

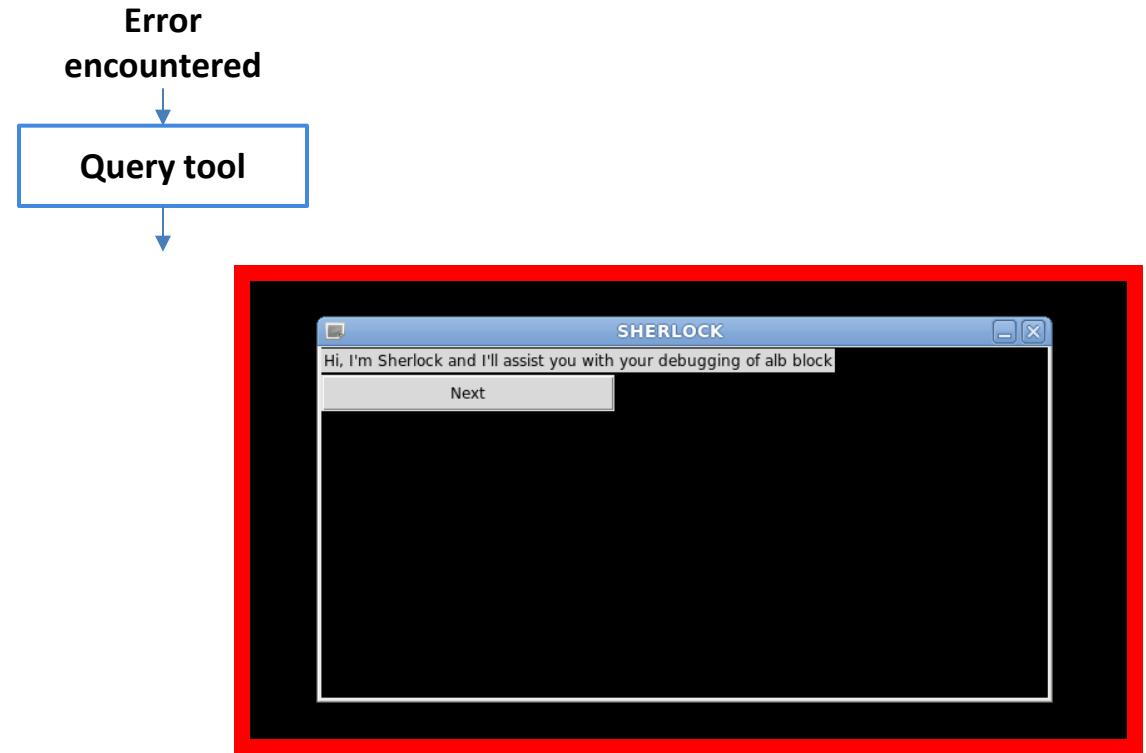
- A tool that captures and reuses debug-knowledge via error signatures and likely root-causes

SHERLOCK

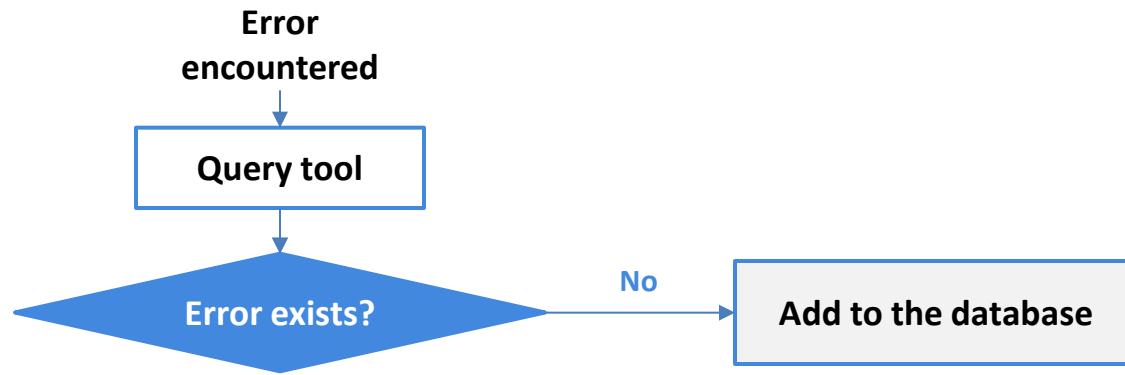
Core components



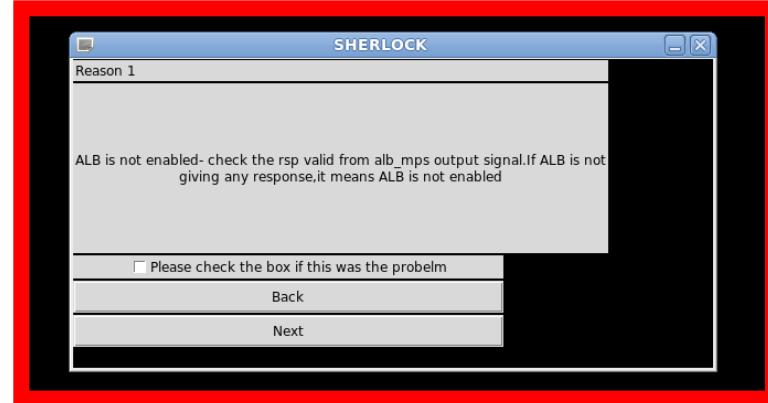
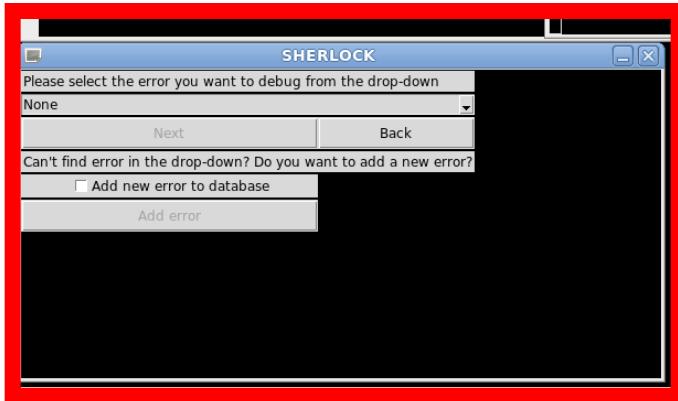
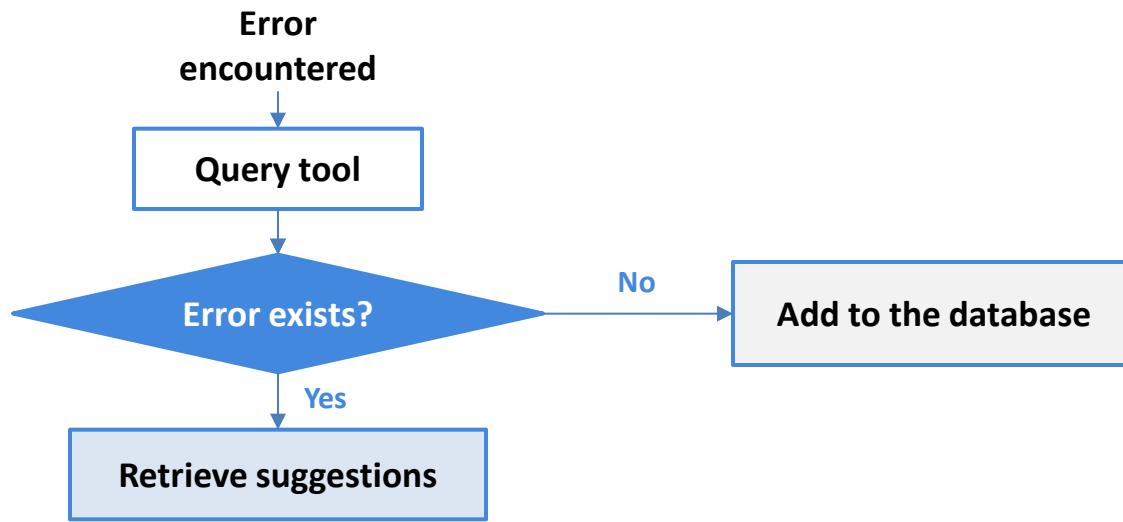
Workflow overview



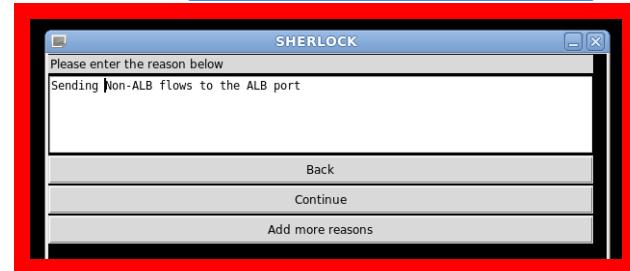
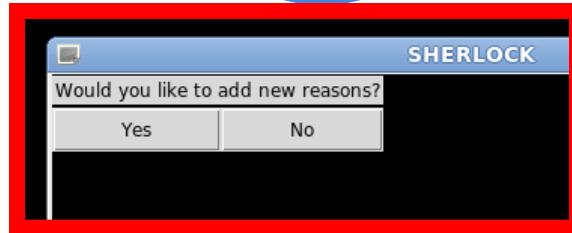
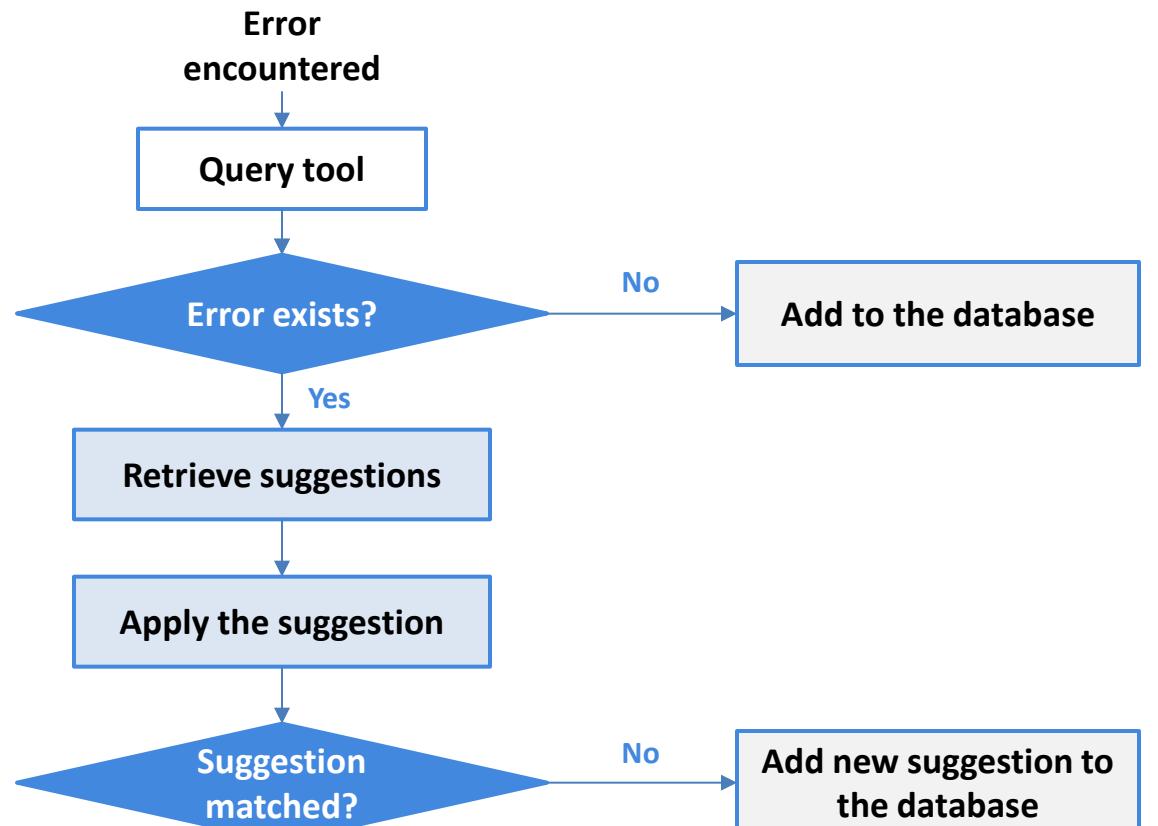
Workflow overview..



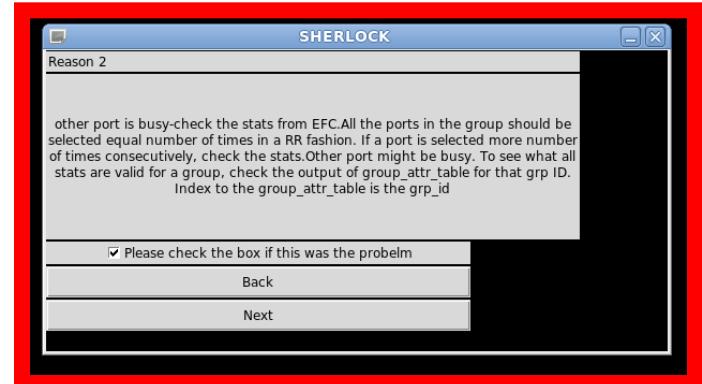
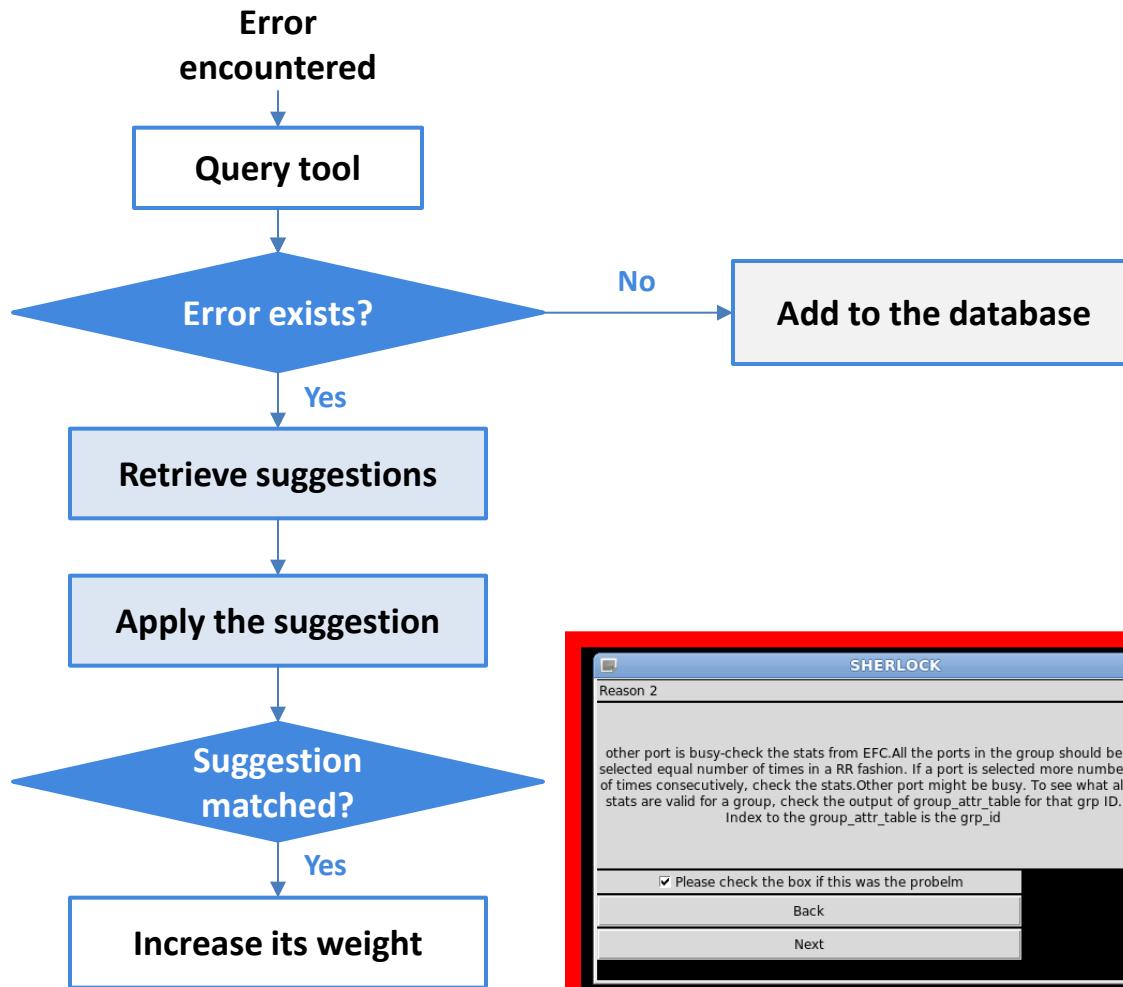
Workflow overview..



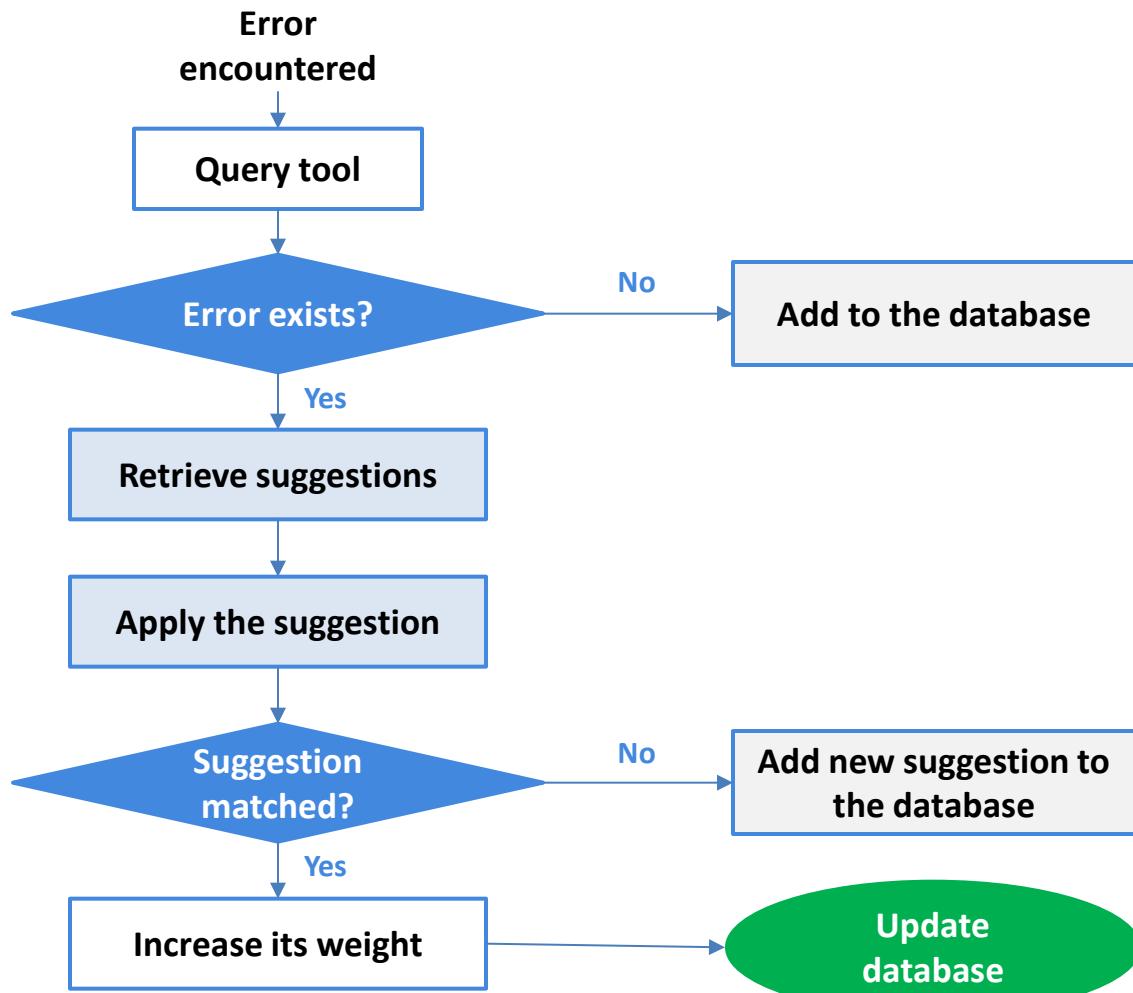
Workflow overview..



Workflow overview..



Workflow overview..



Workflow overview..

Update
database



Advantages

1

Reduces dependency on prior engineers for debug knowledge

2

Accelerates root cause identification by leveraging past experience

3

Continuously improves as more data is added

4

Scales across teams and projects, esp useful in reused IP scenarios

5

Reduces onboarding time for engineers new to a block

6

Minimizes delays caused by engineer unavailability or time zone differences

7

Preserves and scales tribal knowledge across teams and projects

8

Improves consistency and speed in debug practices

Example

Modified IP takes 6 months to finish.

Based on Panopto Survey:



Time spent on dependencies

- 19 hrs/week => 456 hrs in 6 months



With SHERLOCK

- Dependency reduced by 50% => 228 hrs => 28 days

Integration Strengths

Setup Agnostic

Works with any company's verification flow.
No Major infra changes needed

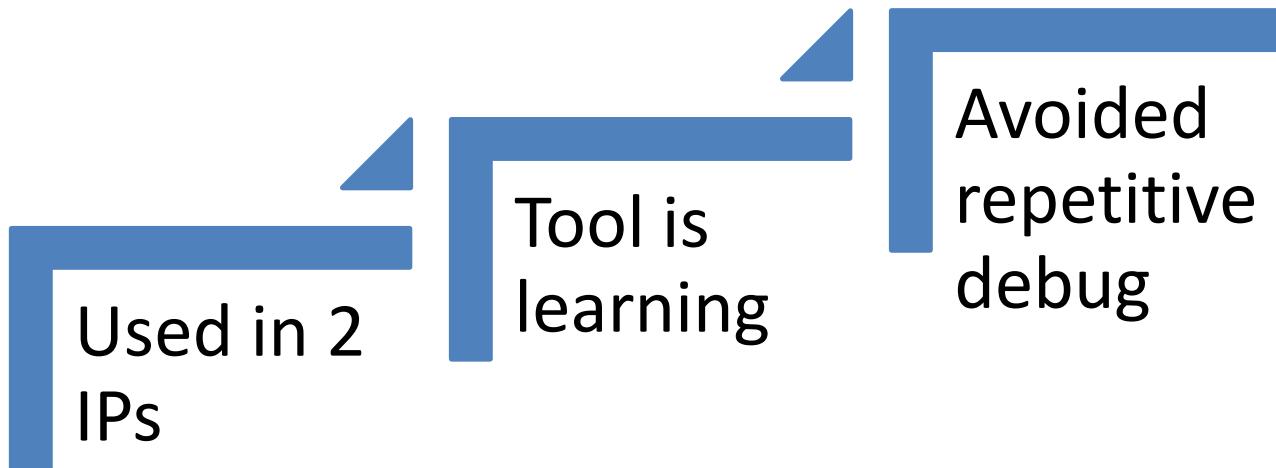
Script Integration

Hooks into existing regression scripts

IP & SoC Ready

Supports both IP and SoC verification

Pilot Deployment Findings



Pilot Deployment Findings..

Self-Resolution	Weighted Ranking	Knowledge Sharing	Actionable Pointers	Improving Accuracy
Engineers fixed recurring issues independently	Prioritized fixes based on likelihood	Promoted collaborative debugging	Reduced time-to-fix with clear guidance	Gets better as database grows

Limitations & Considerations

Cold start

Effectiveness depends on data accumulation

Error Signature Variability

Normalization may be needed

Engineer participation

Depends on active contributions

Future Enhancements

Natural language processing for intelligent error matching

Machine learning models to predict causes based on context

Questions