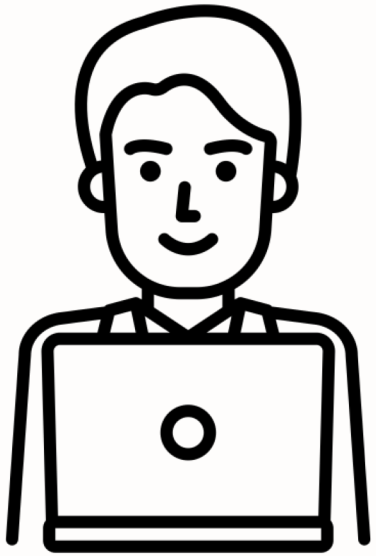
ICSE 2018

EVA: A Tool for Visualizing Software Architecture Evolution

Daye Nam, Youn Kyu Lee, and Nenad Medvidovic

University of Southern California

Motivation



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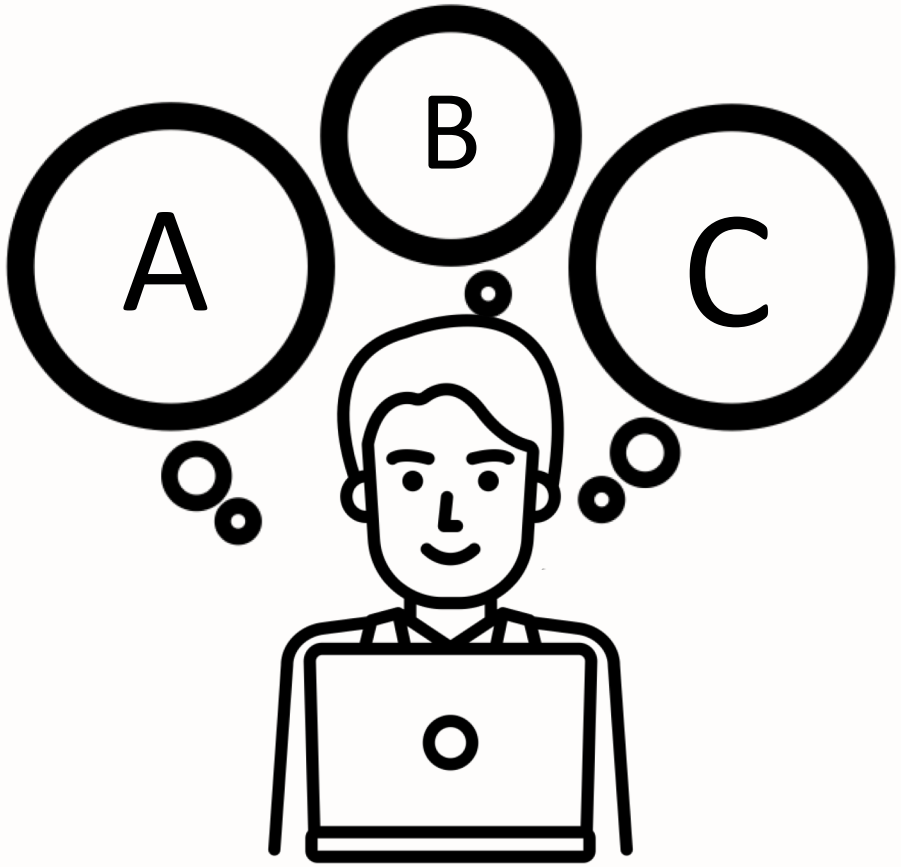

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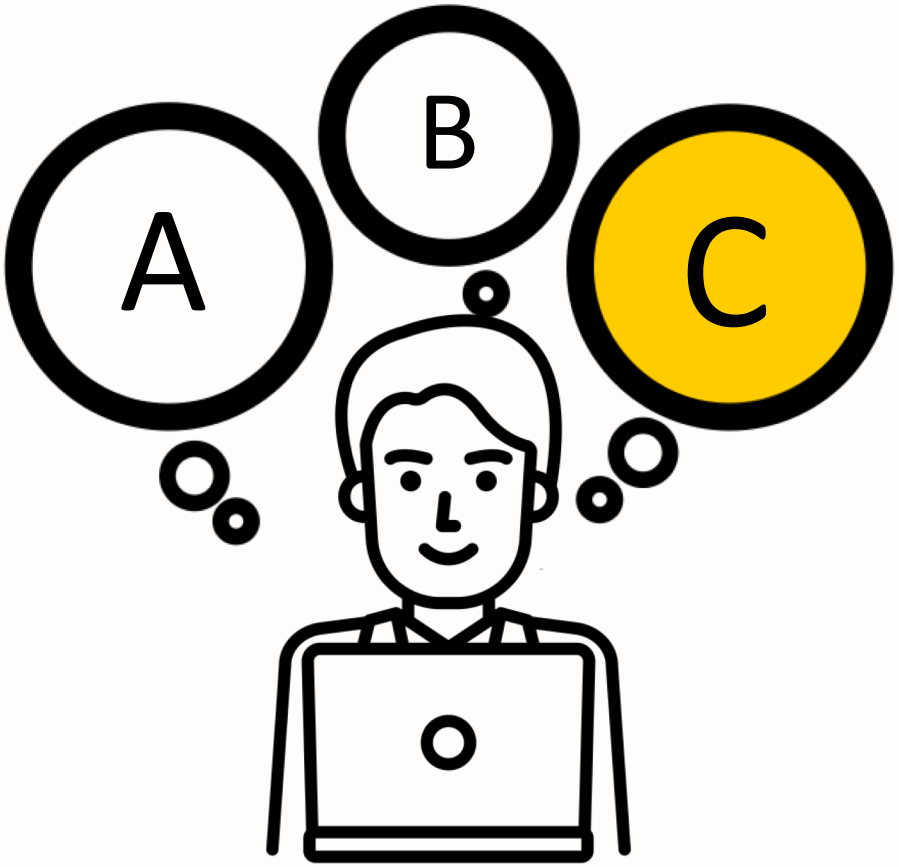

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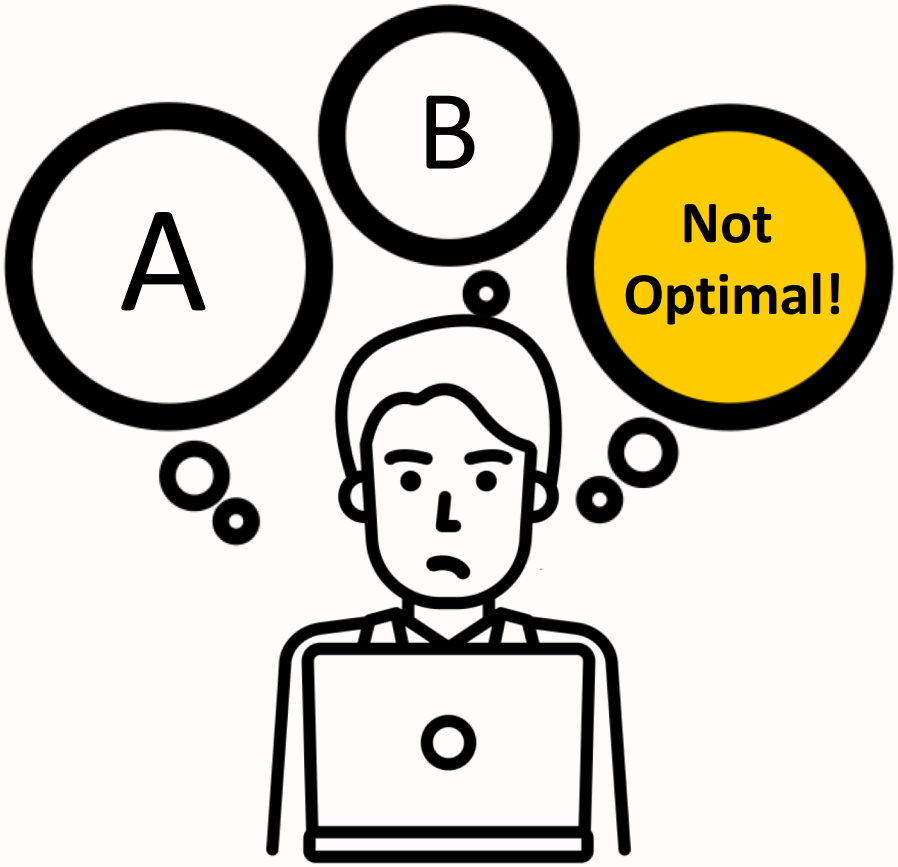

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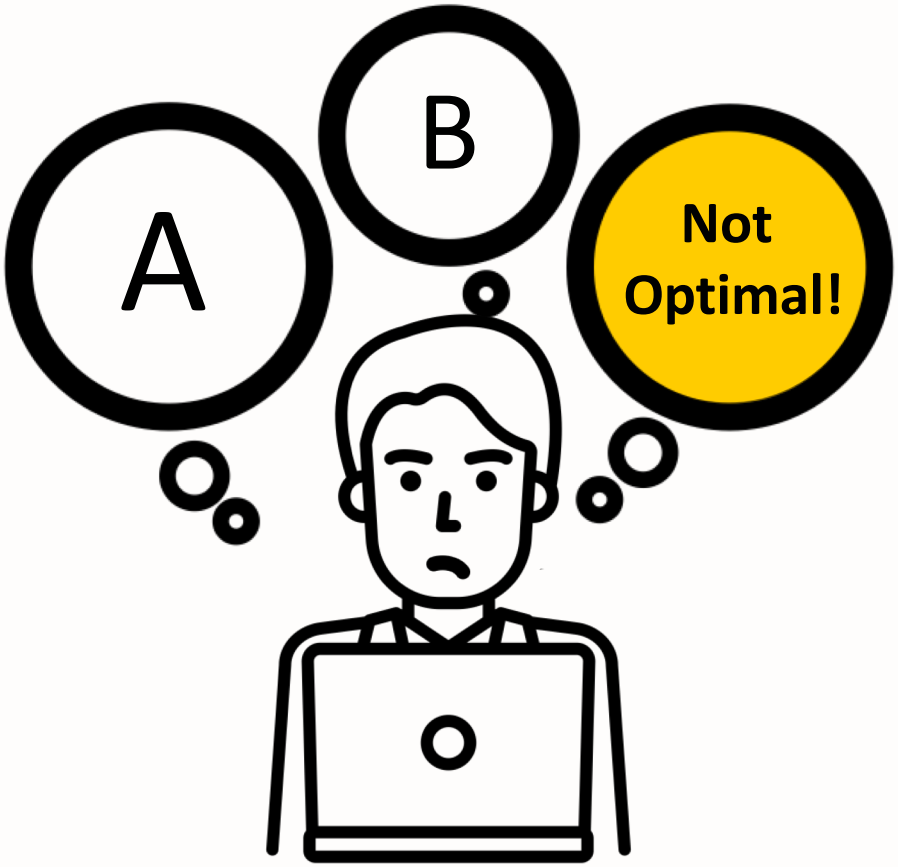

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Inadvertent Architectural Changes

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Inadvertent Architectural Changes

- **Accumulation of Technical Debt**
- **Deterioration of Software Quality**

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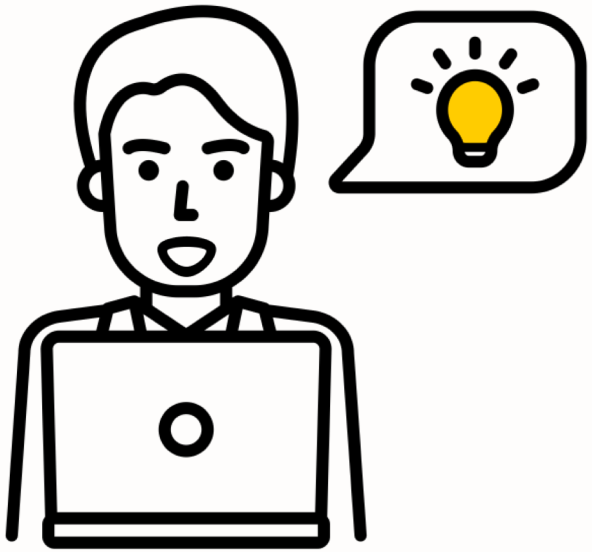

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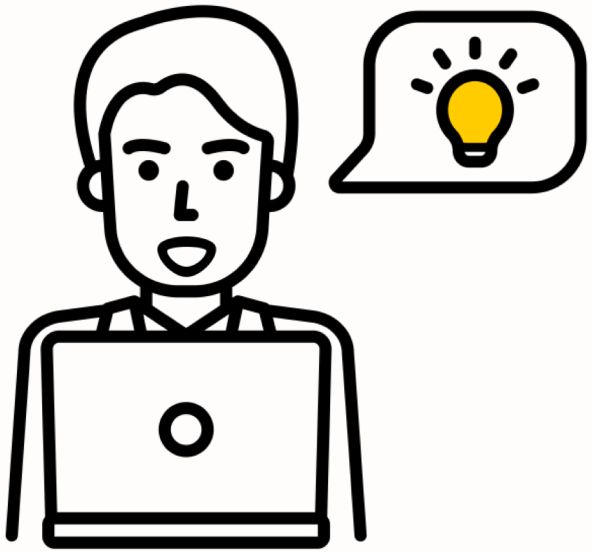

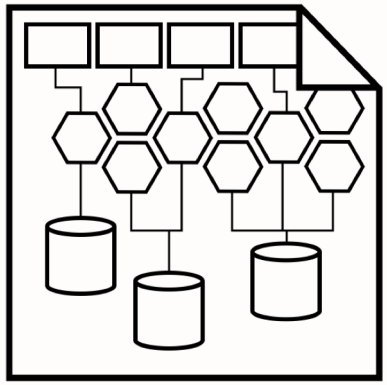

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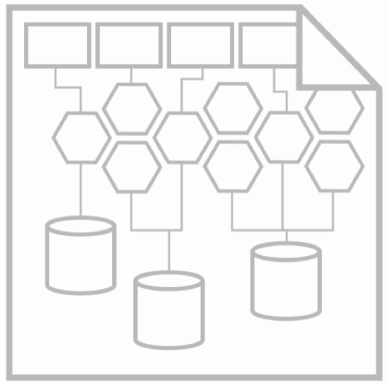

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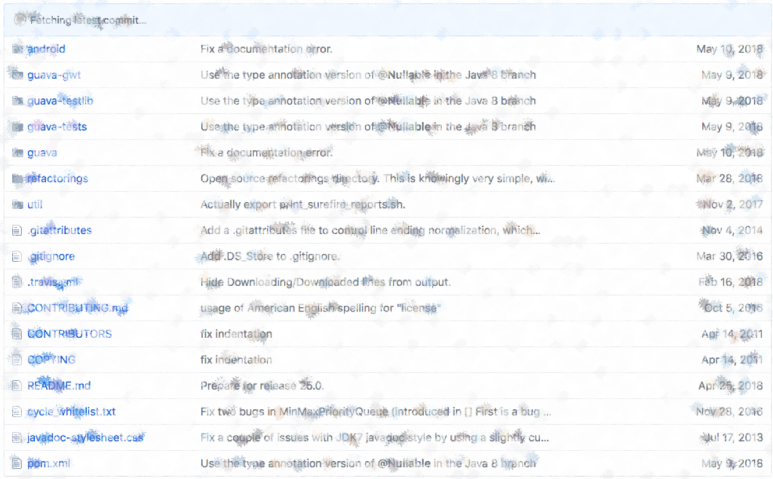
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android Fix a documentation error. May 10, 2018
guava-gwt Use the type annotation version of @Nullable in the Java 8 branch May 9, 2018
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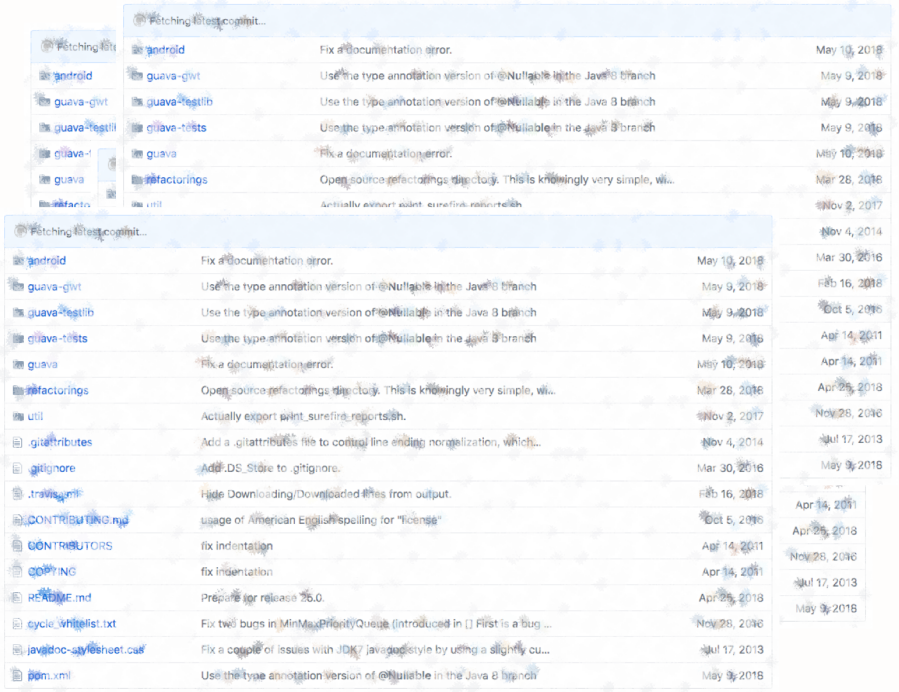
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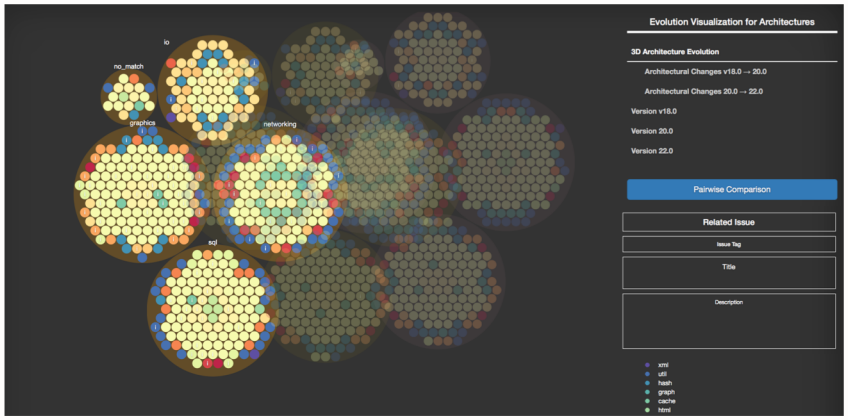
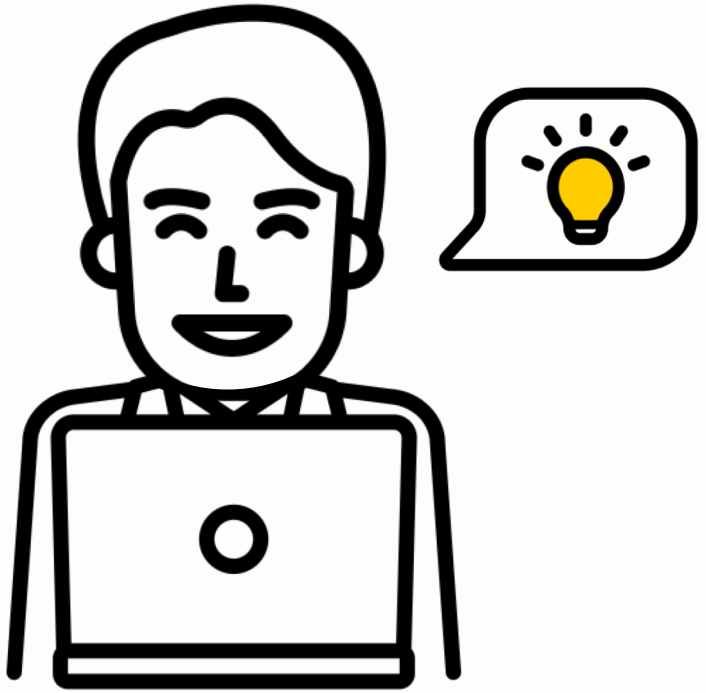
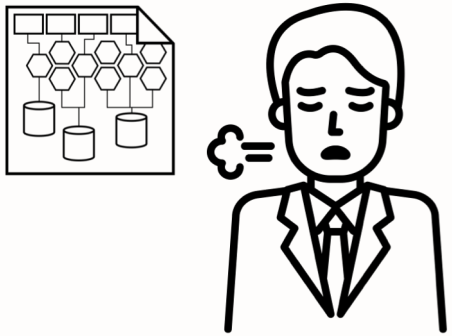
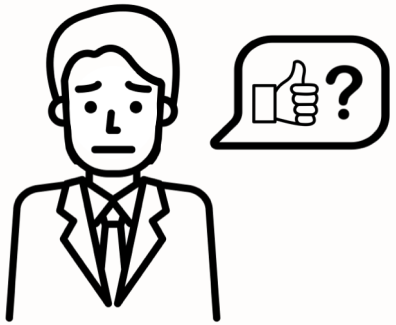




EVA:

Evolution Visualization of Architecture

Contributions

Visualization	Exploration	Evaluation
		

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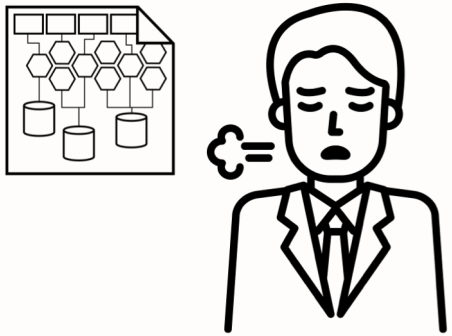
Exploration



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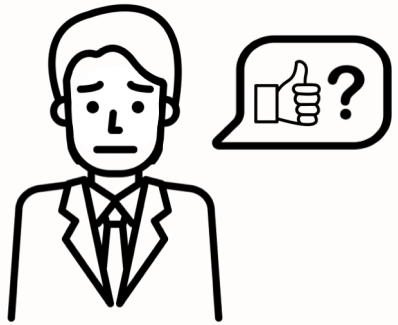

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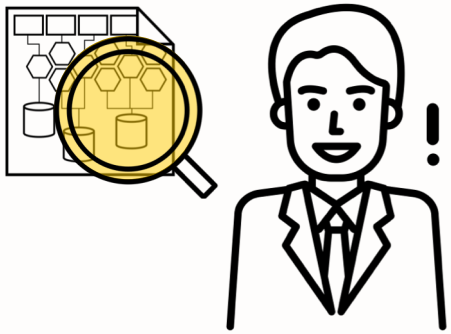

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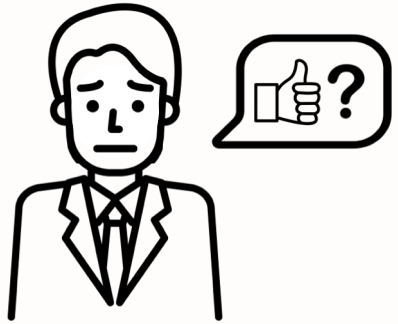

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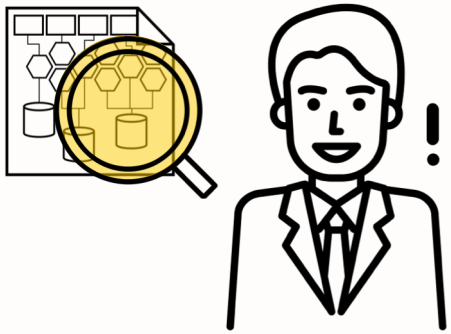

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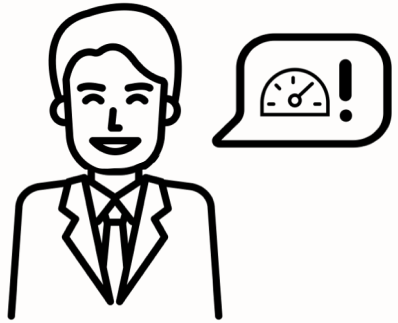
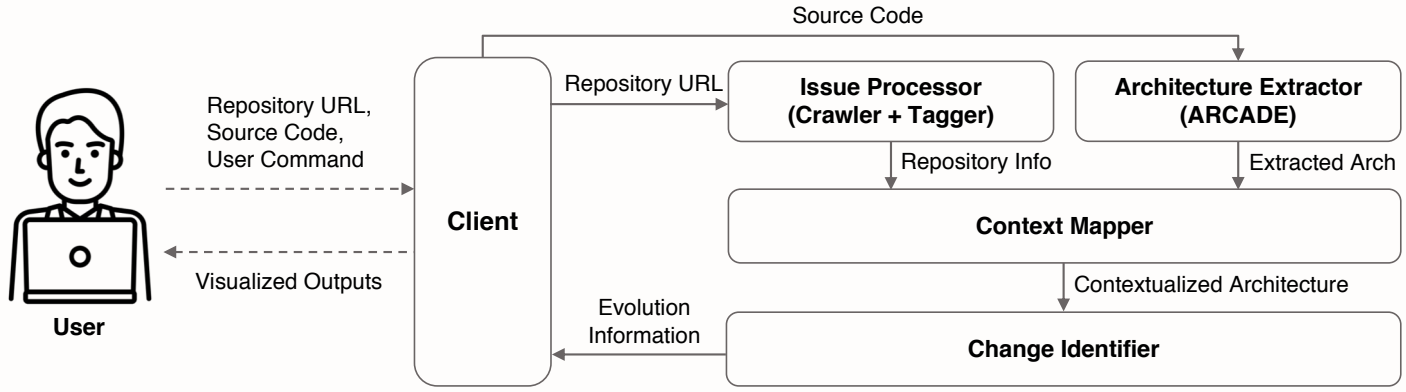


EVA‘s Architecture



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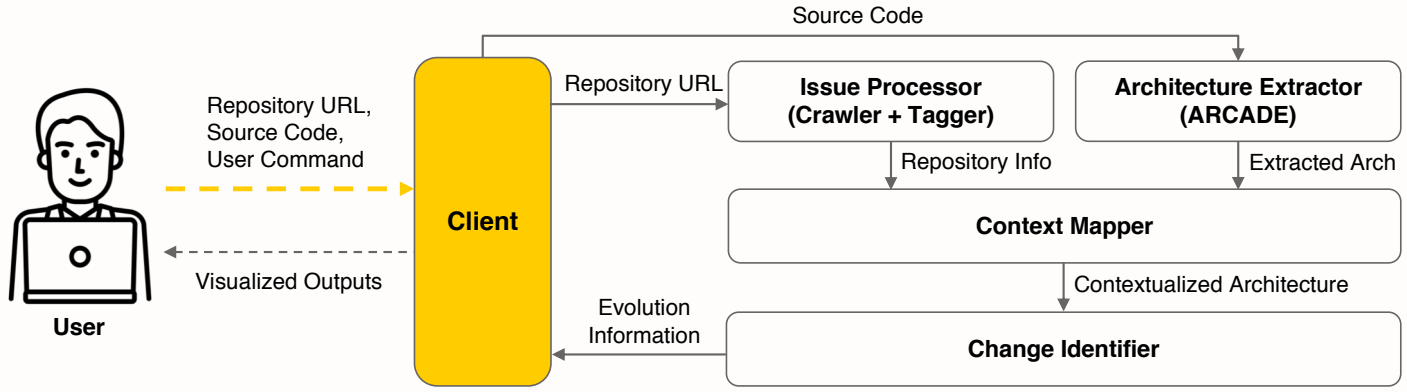
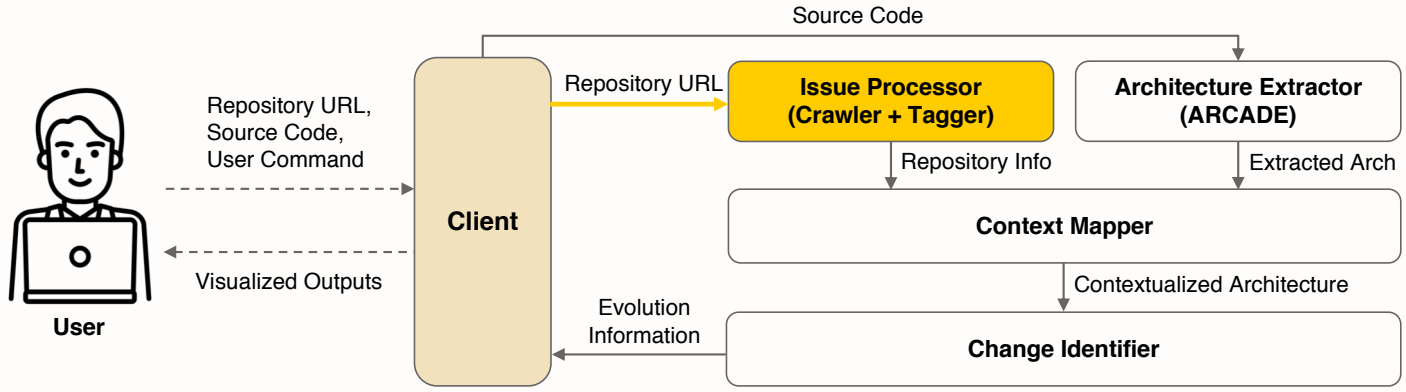


- Repository URL: https://github.com/google/guava
- Source Code:

EVA's Architecture



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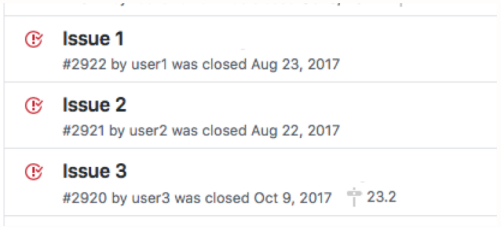

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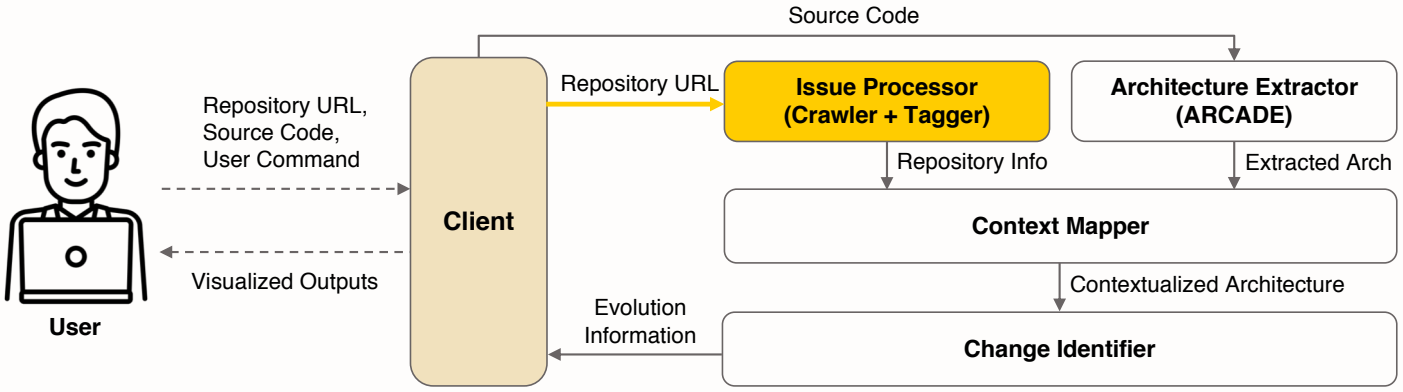

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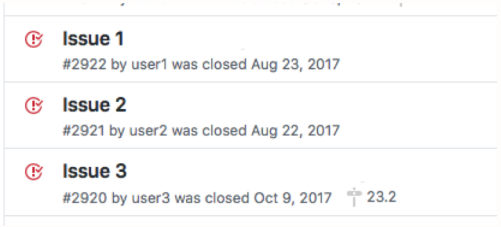

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- Issue Title
- Fixed Time
- Issue Description
- Issue Type
- Impacted Files

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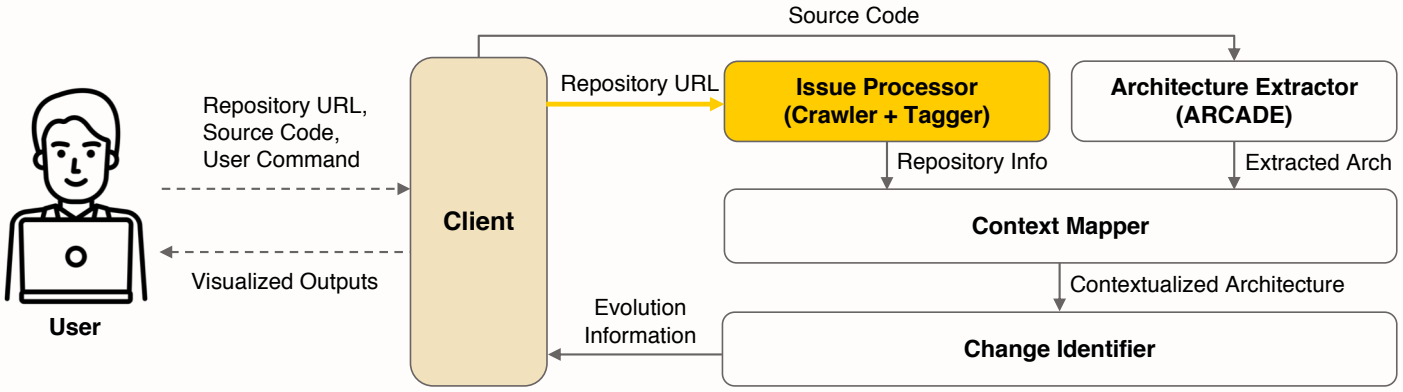

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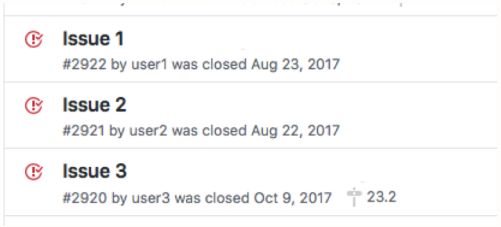

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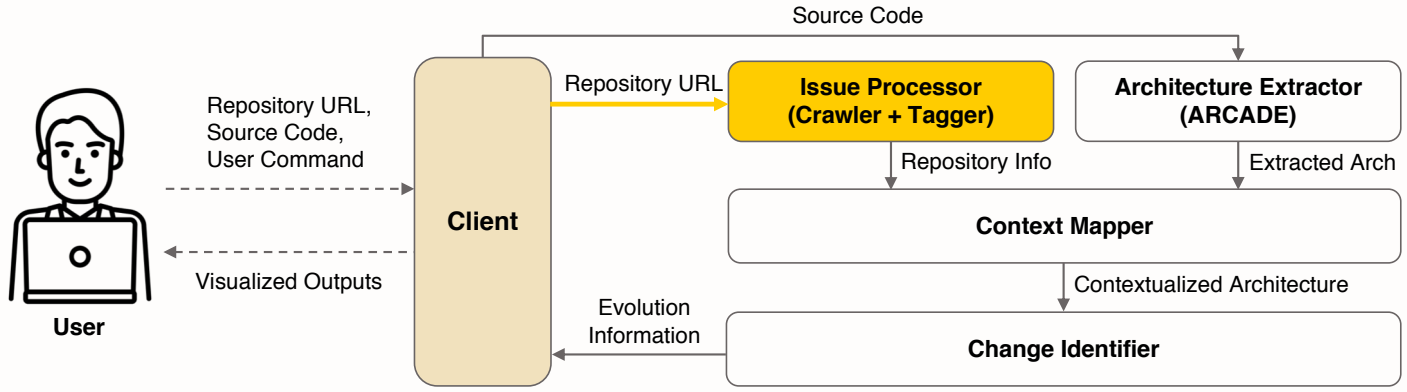

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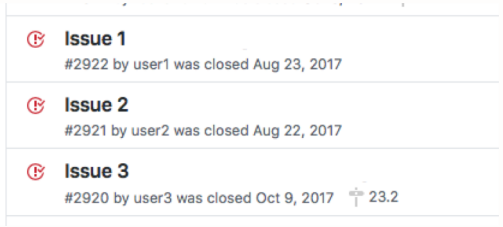

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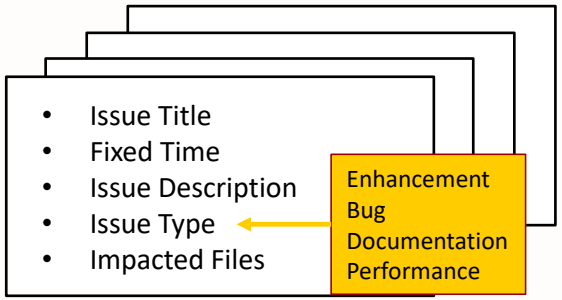

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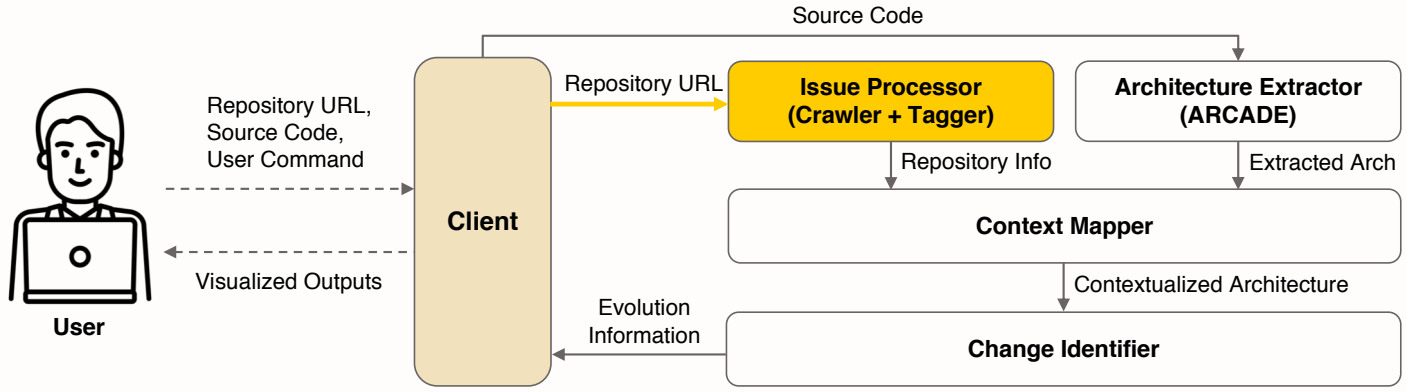

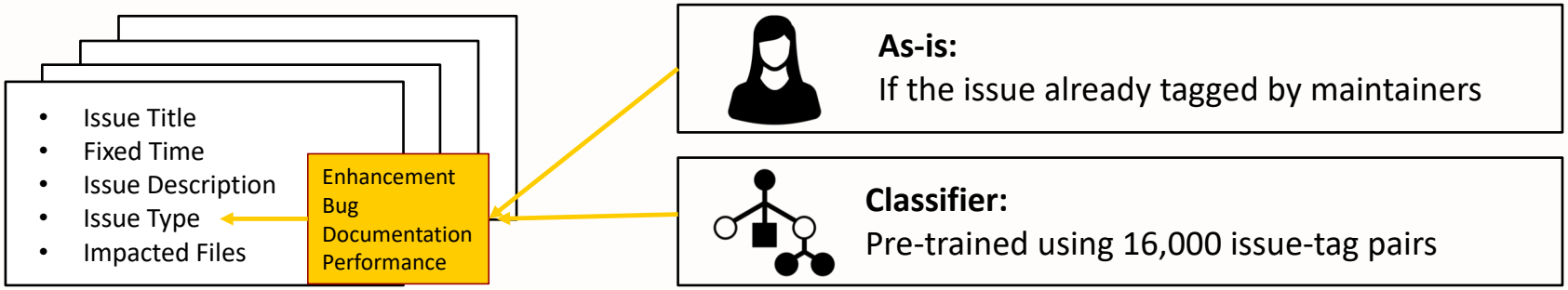

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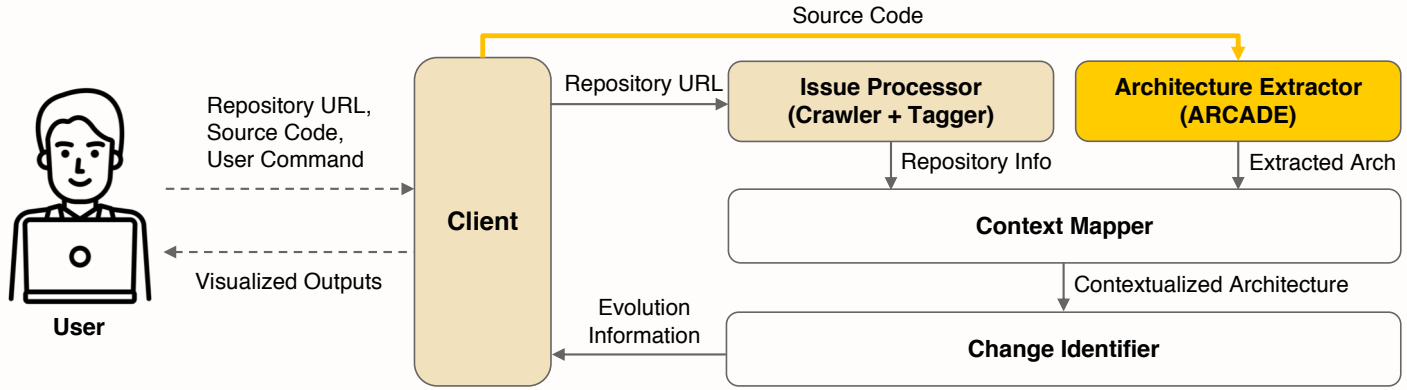

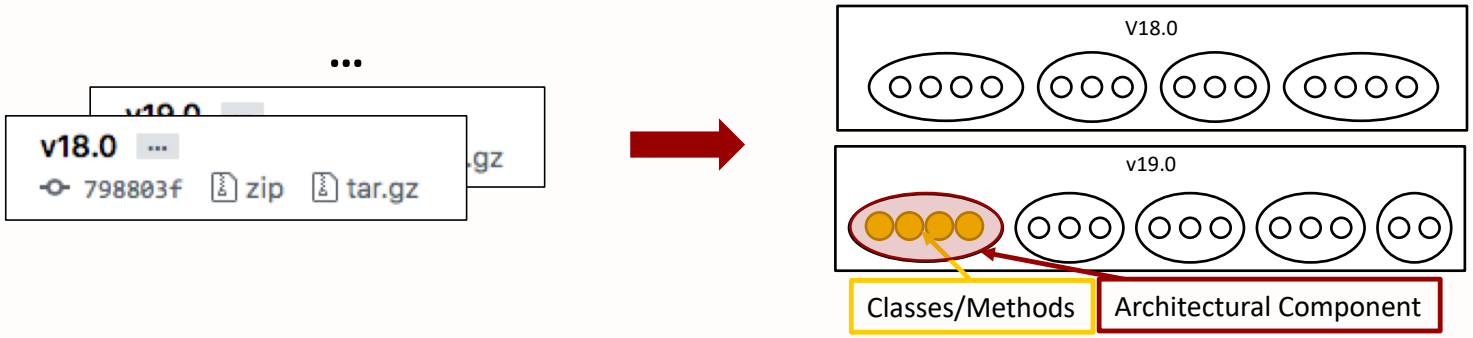

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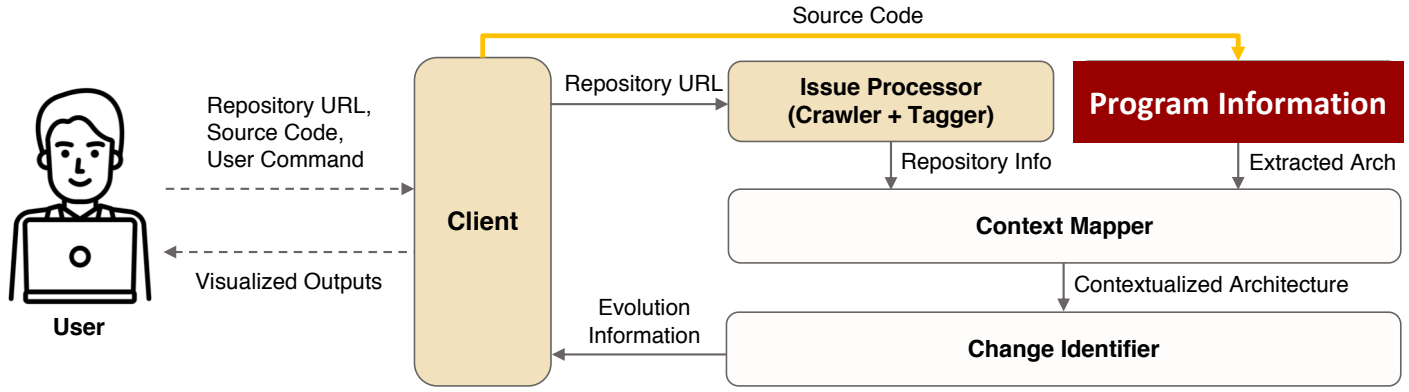
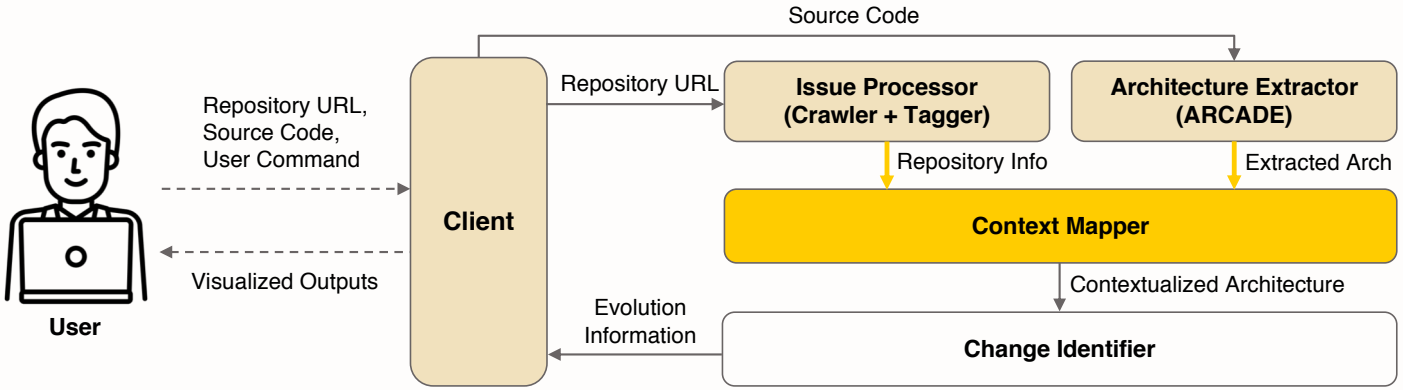
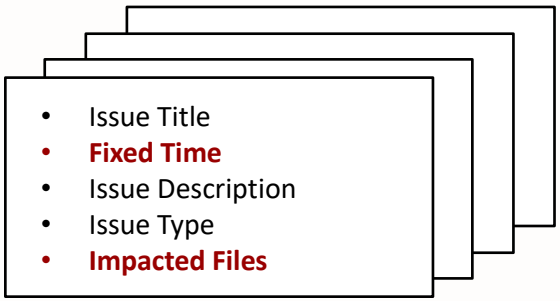
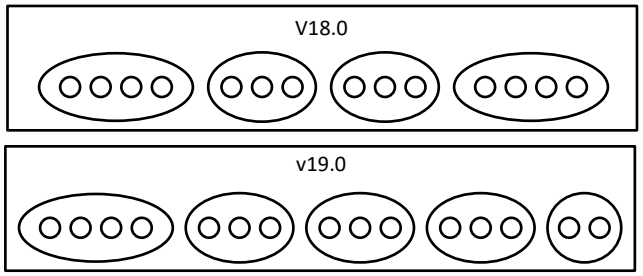


Program Comprehension

EVA's Architecture







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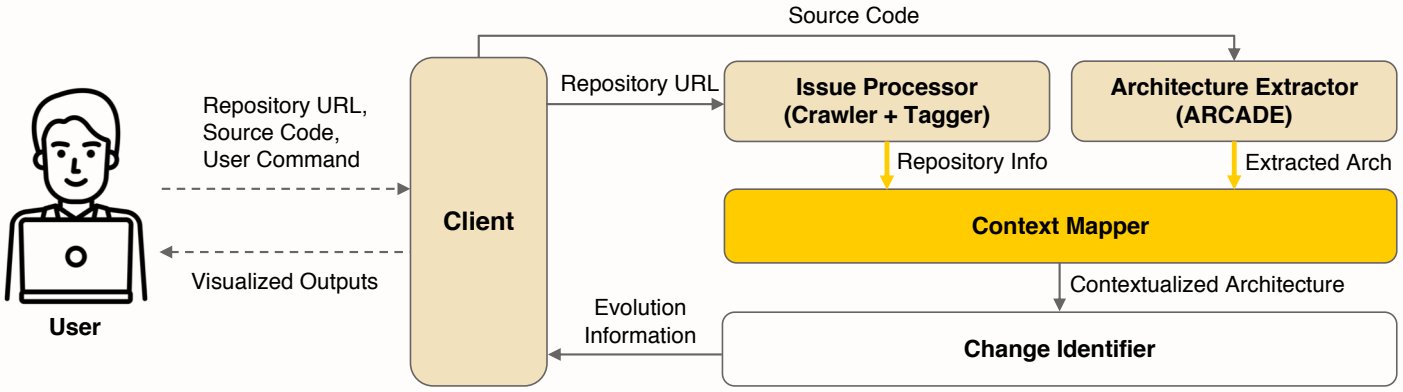

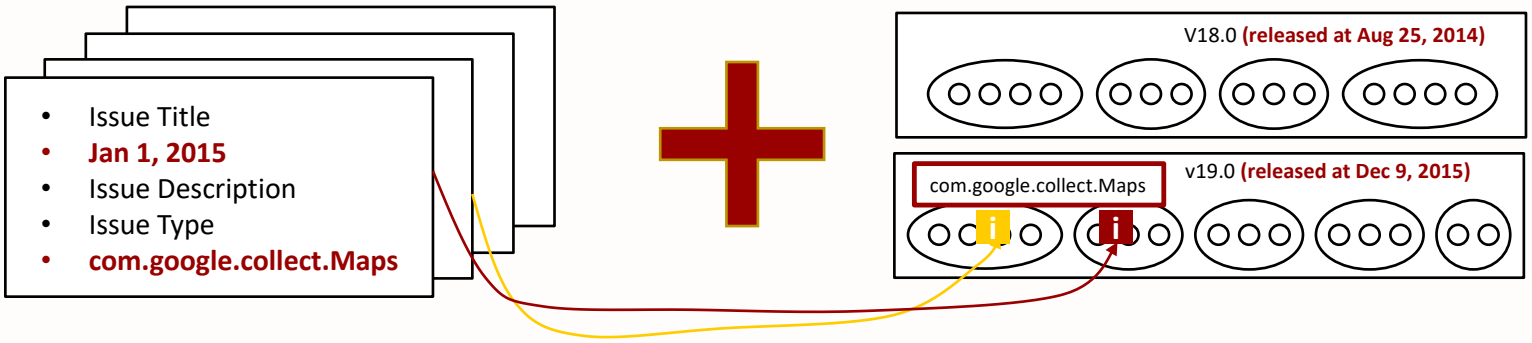

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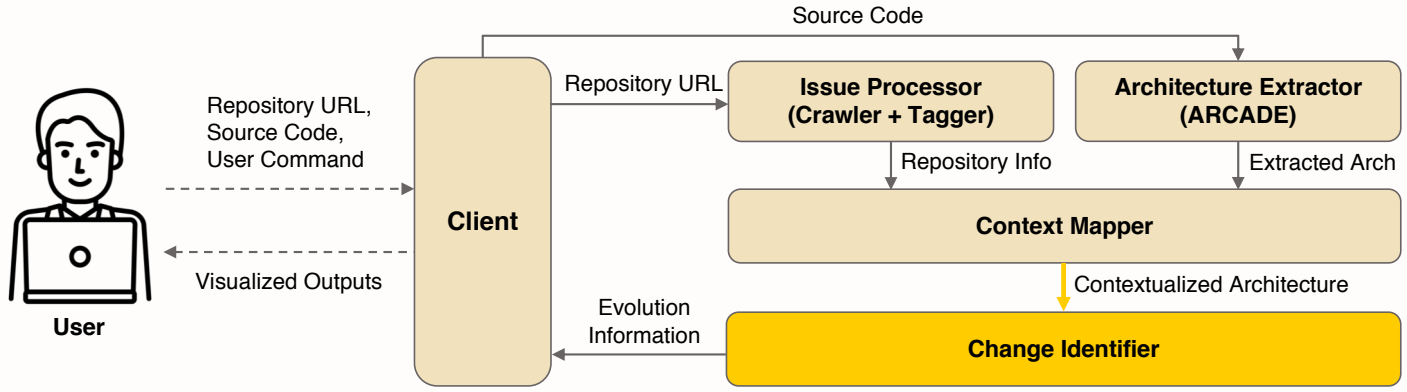

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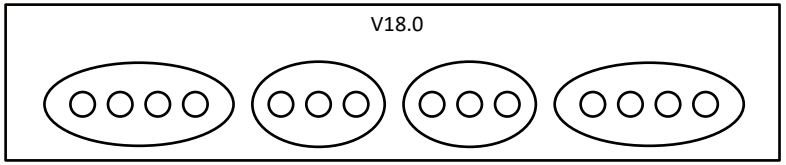

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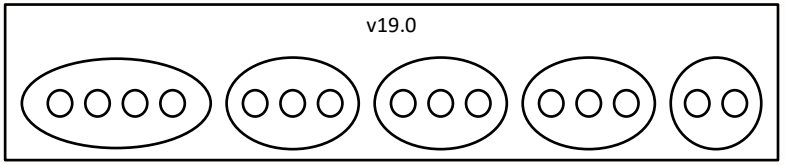

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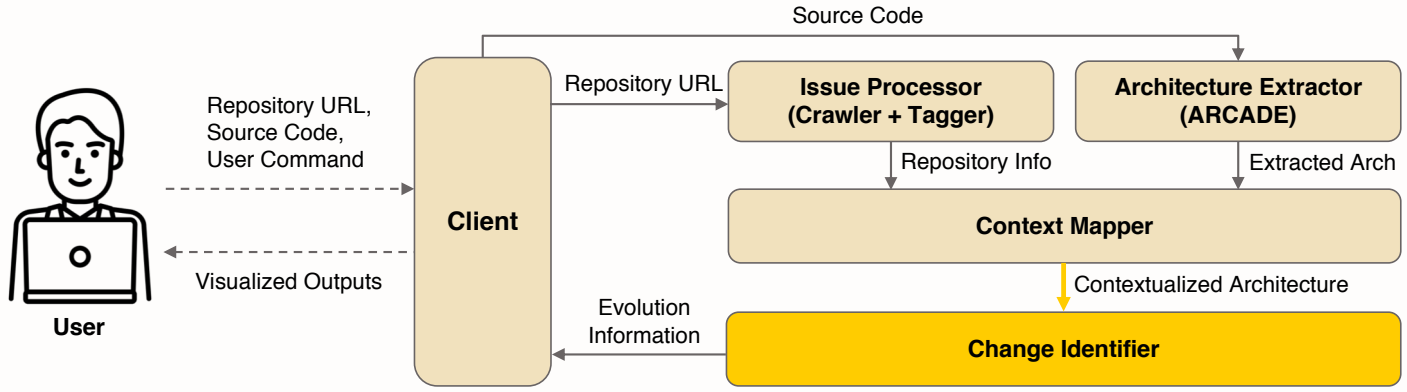

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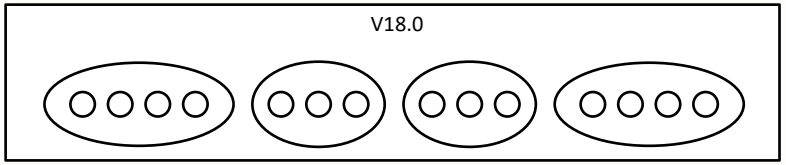

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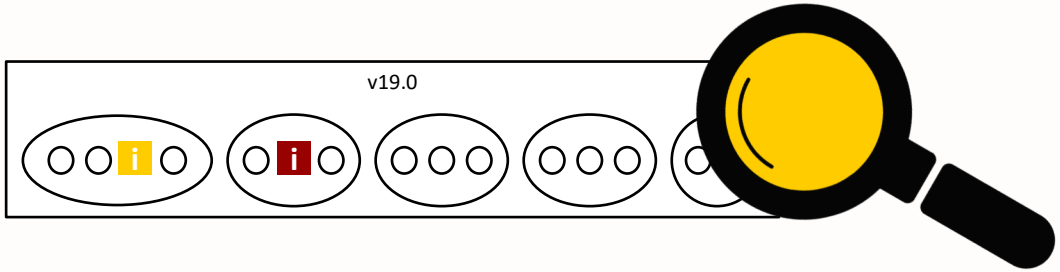

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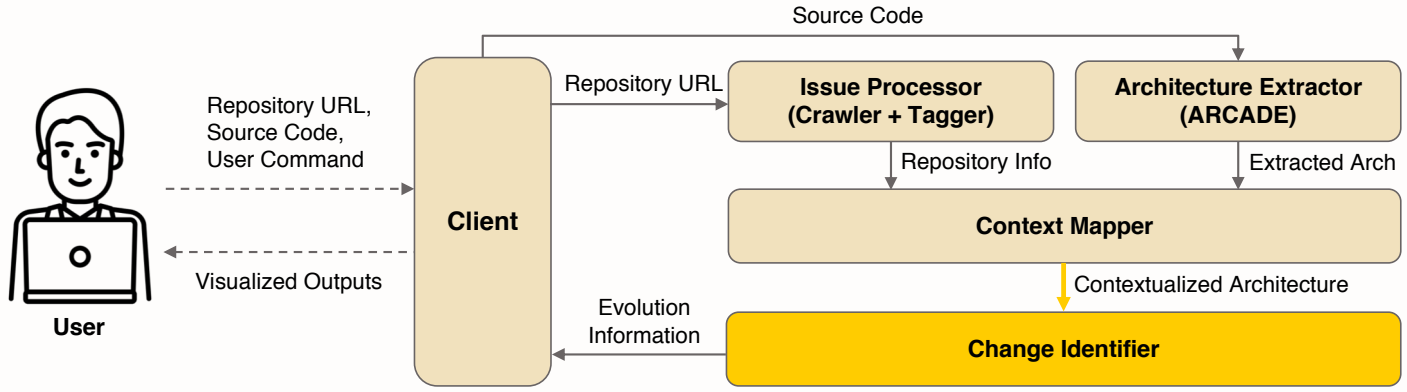

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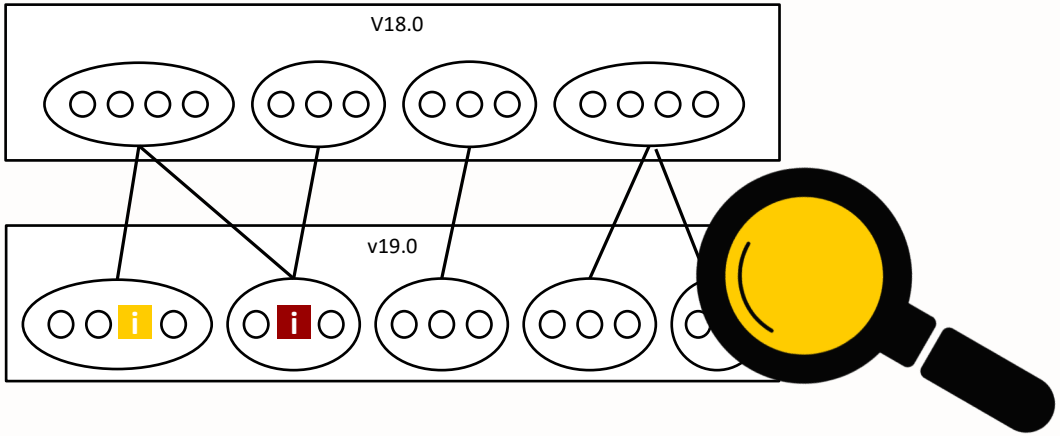
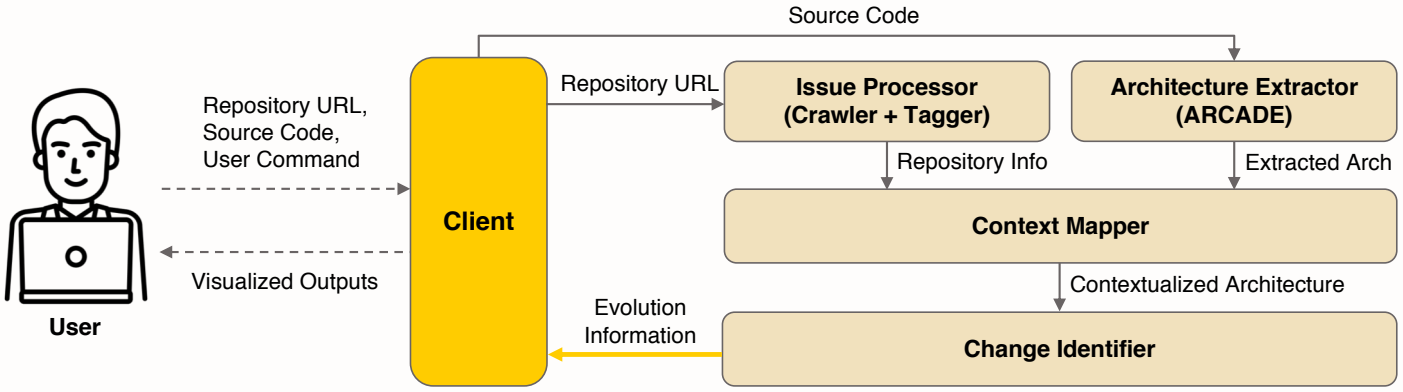
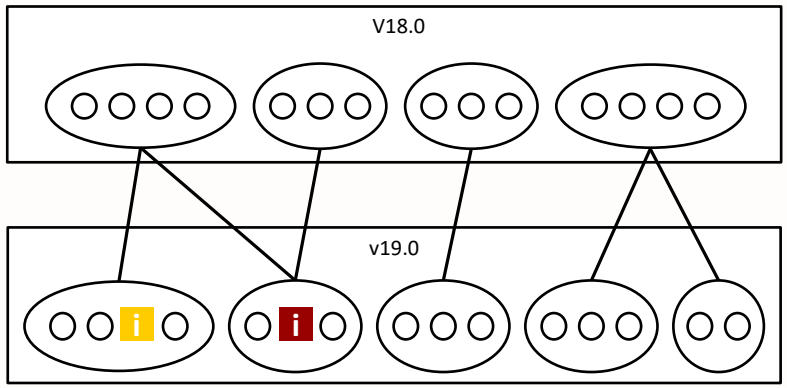
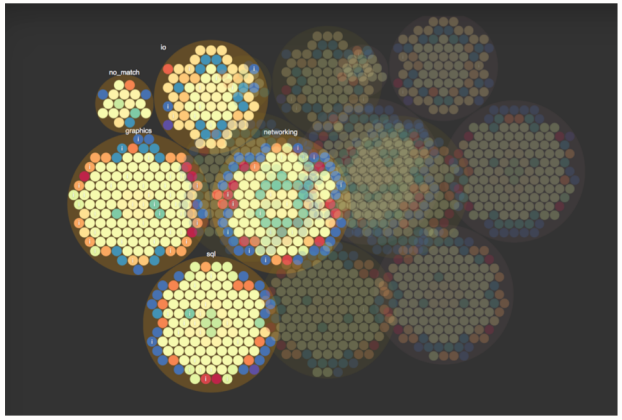


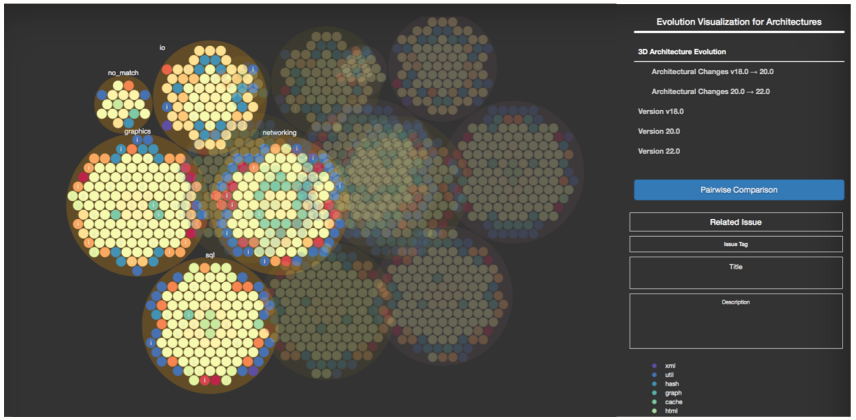
EVA's Architecture

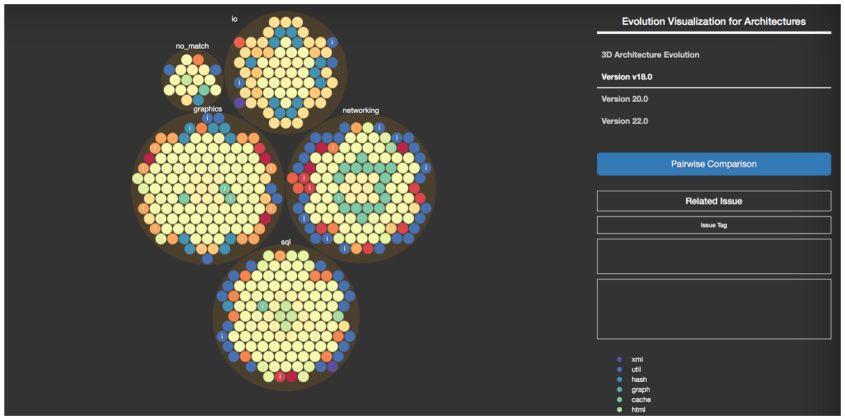


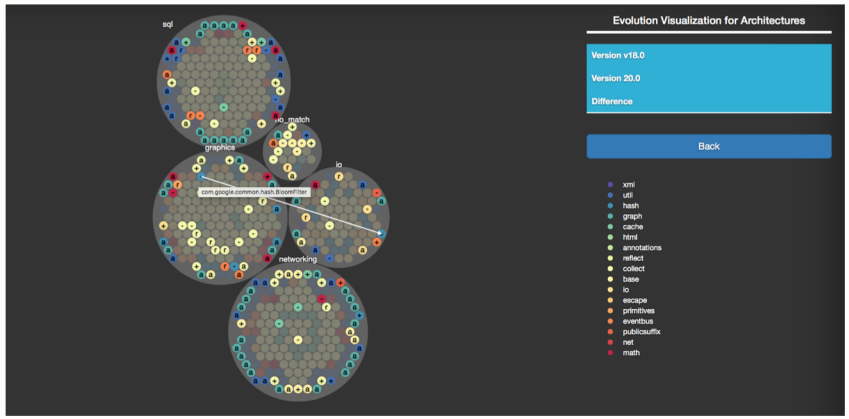




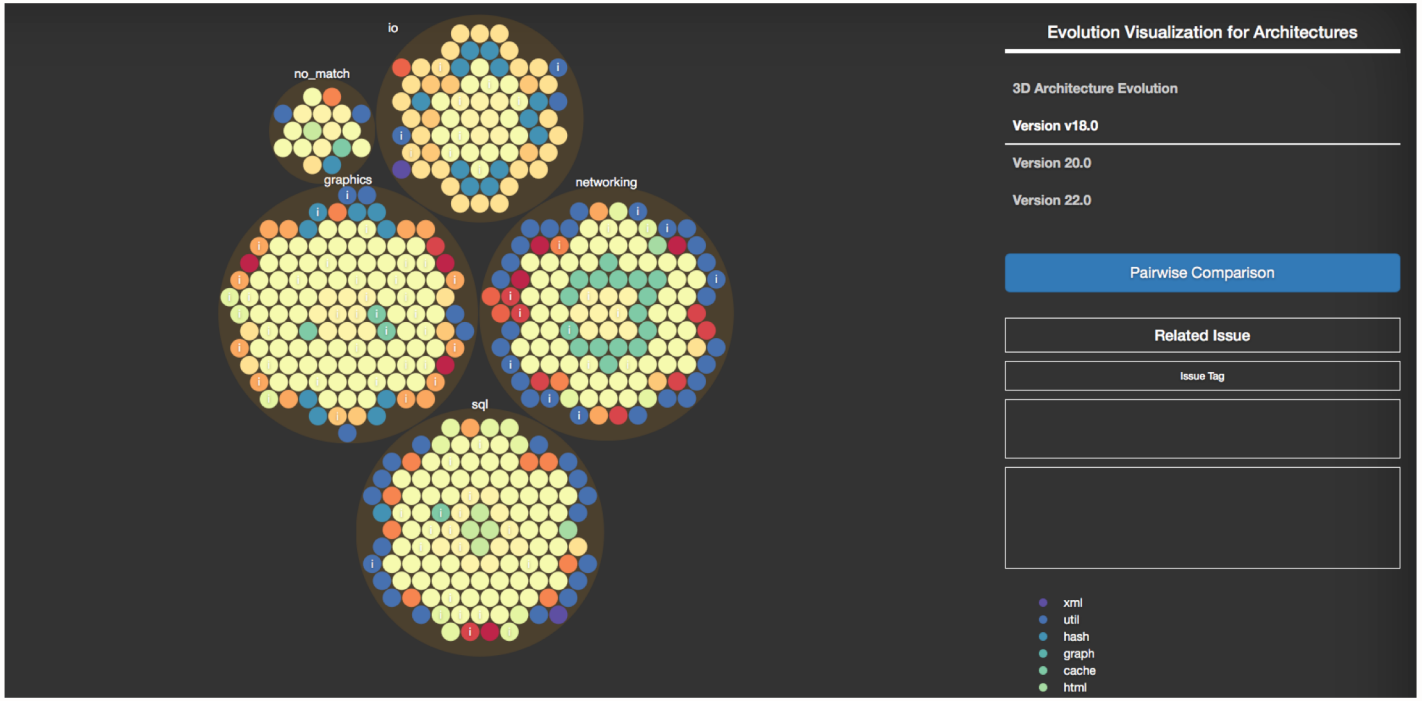
Visualization





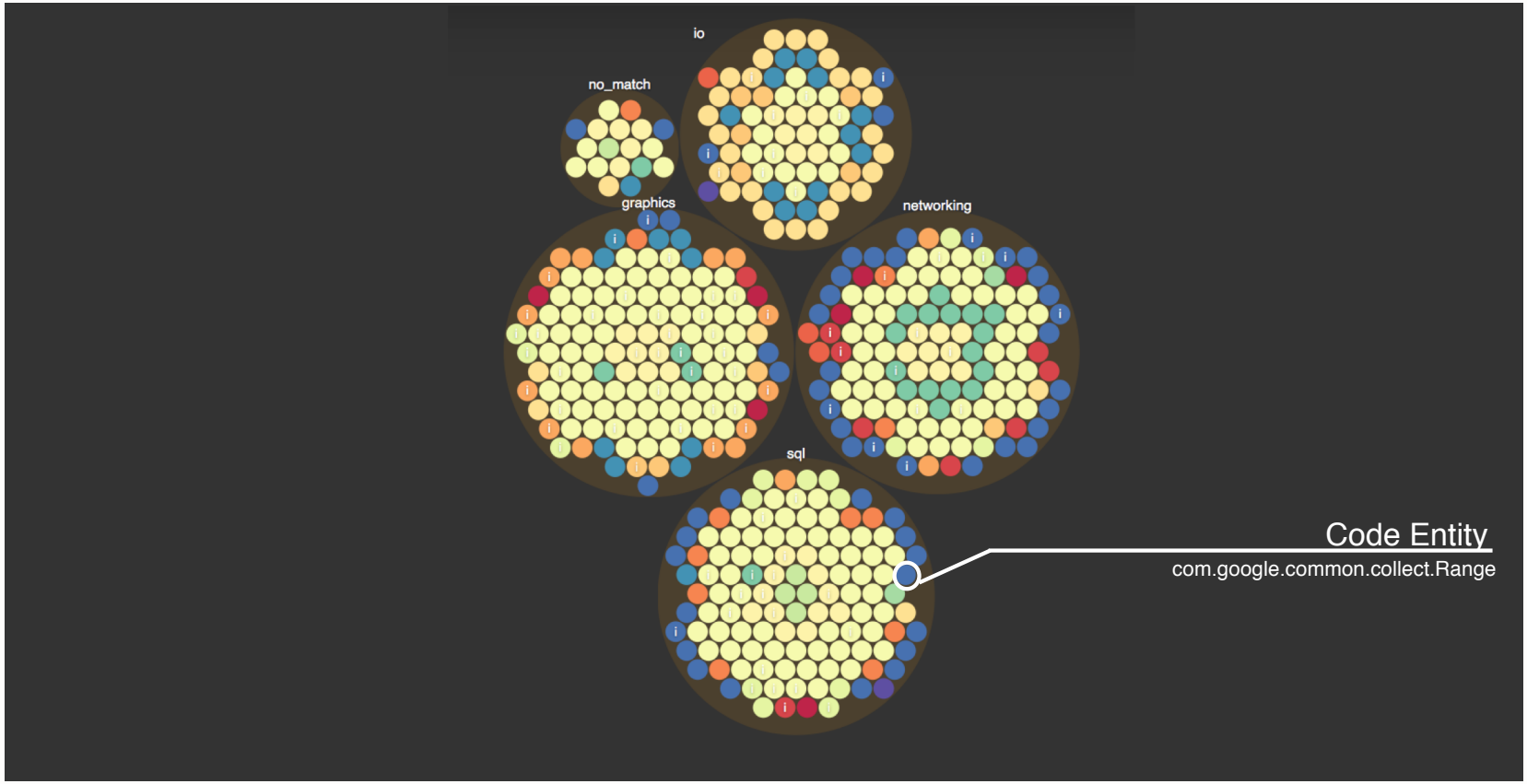


Visualization



Single-Release Architecture View

Visualization



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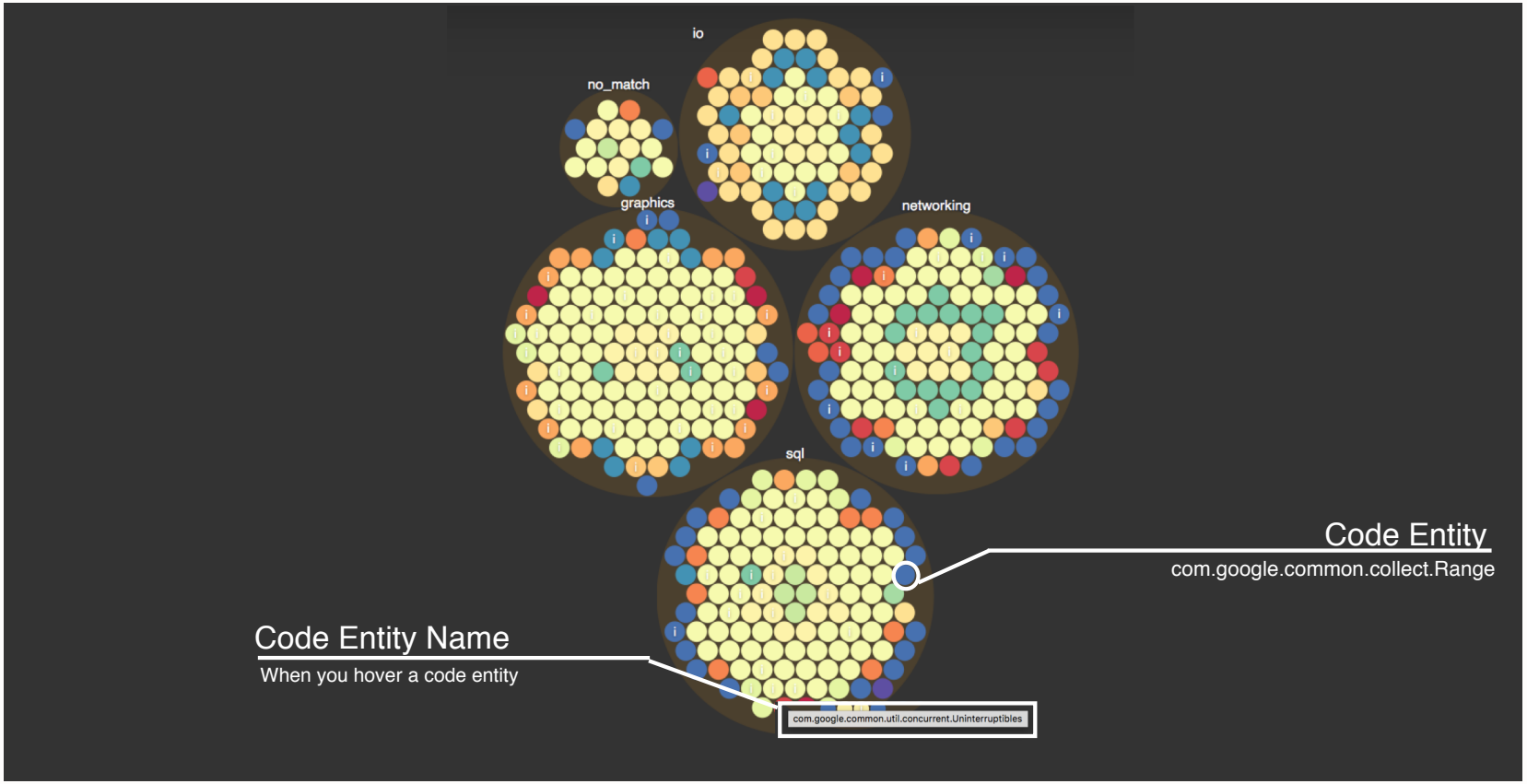

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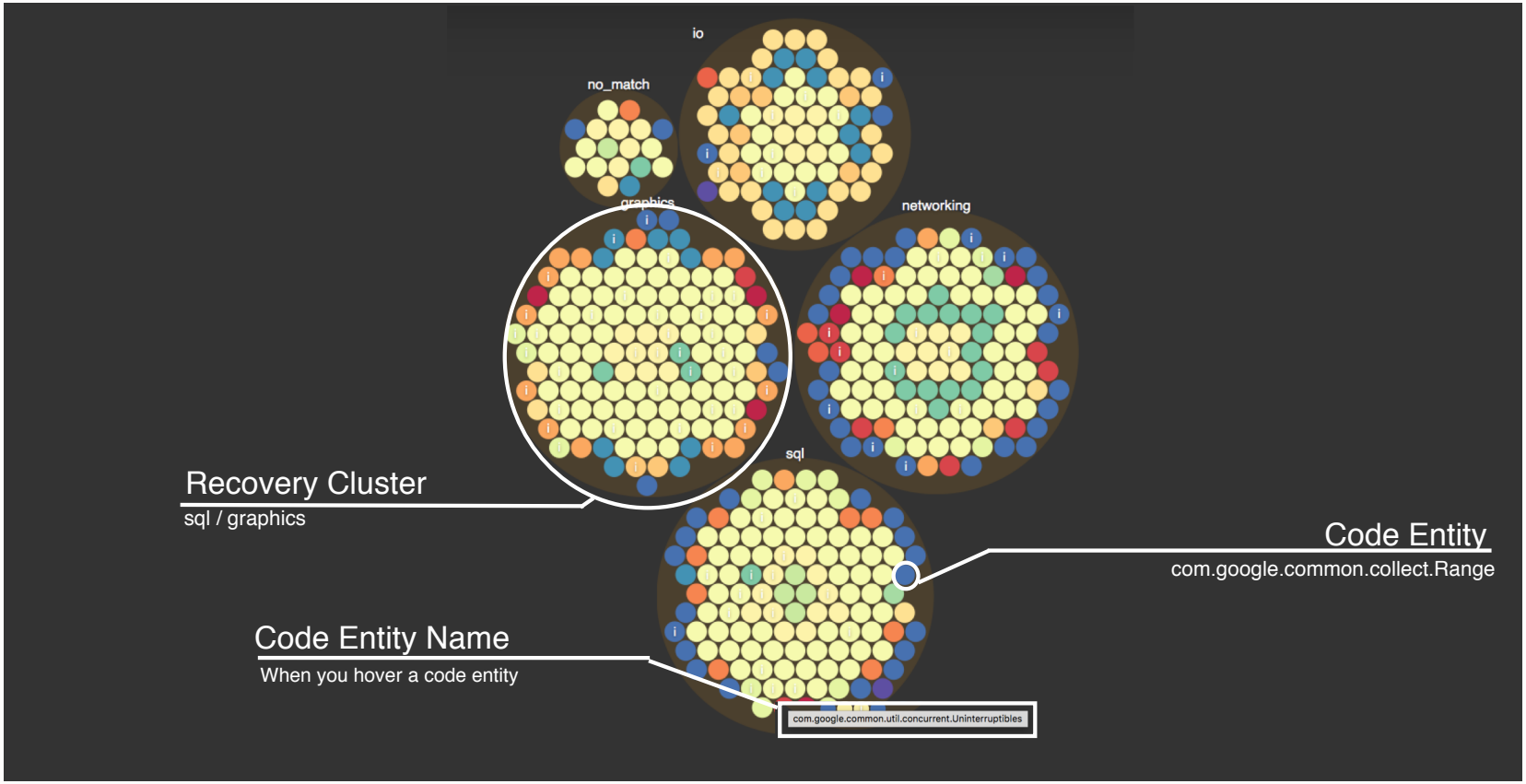

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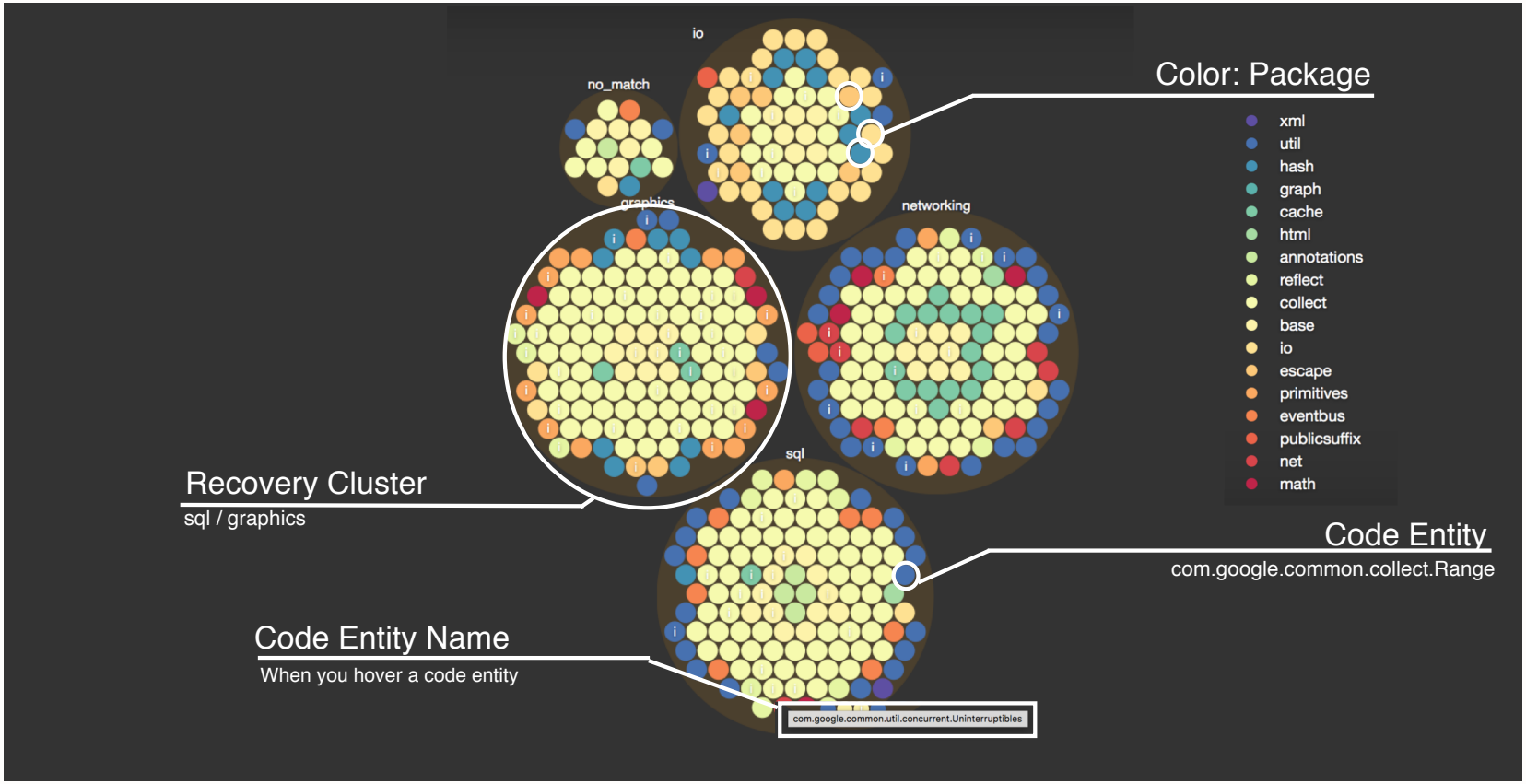

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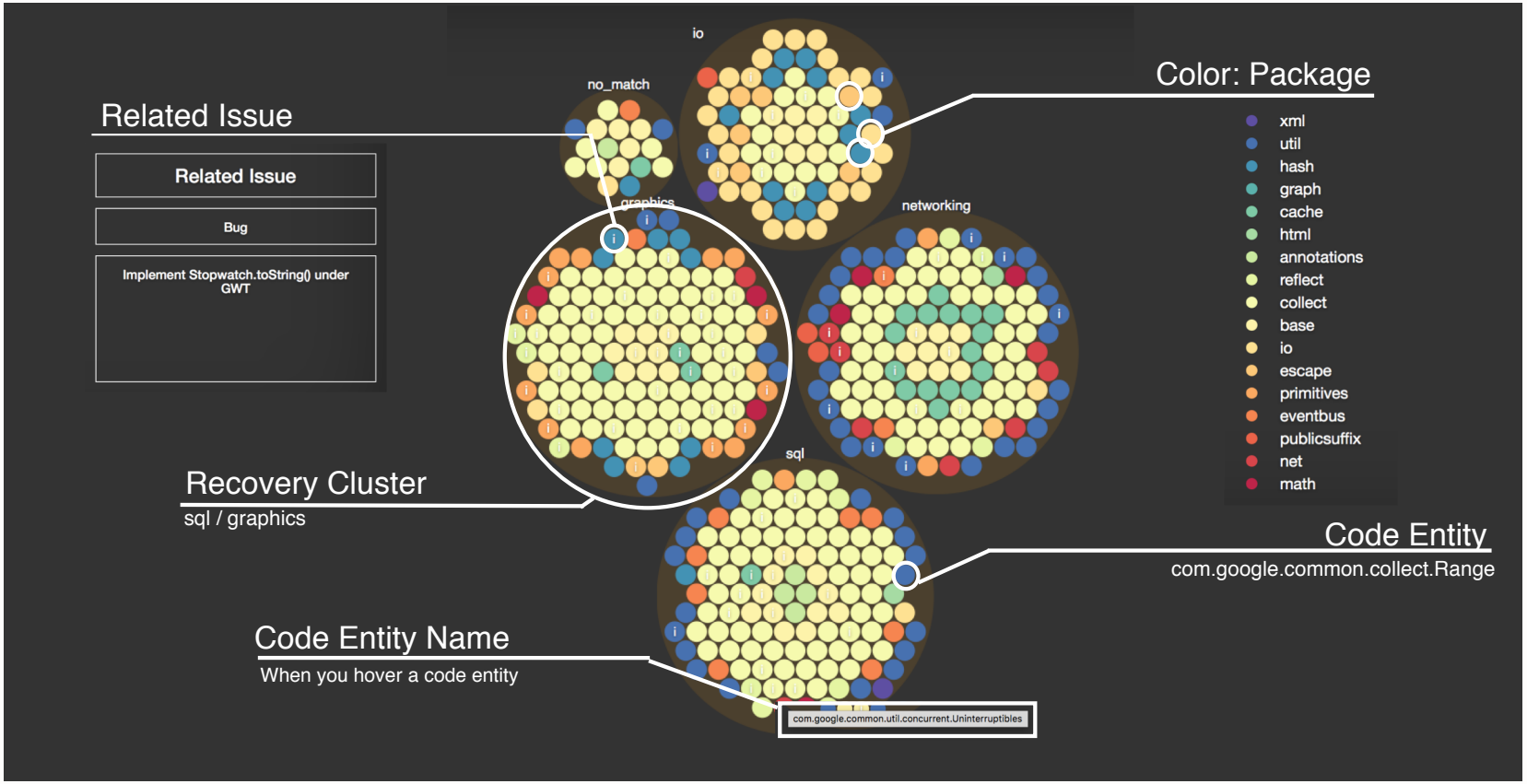

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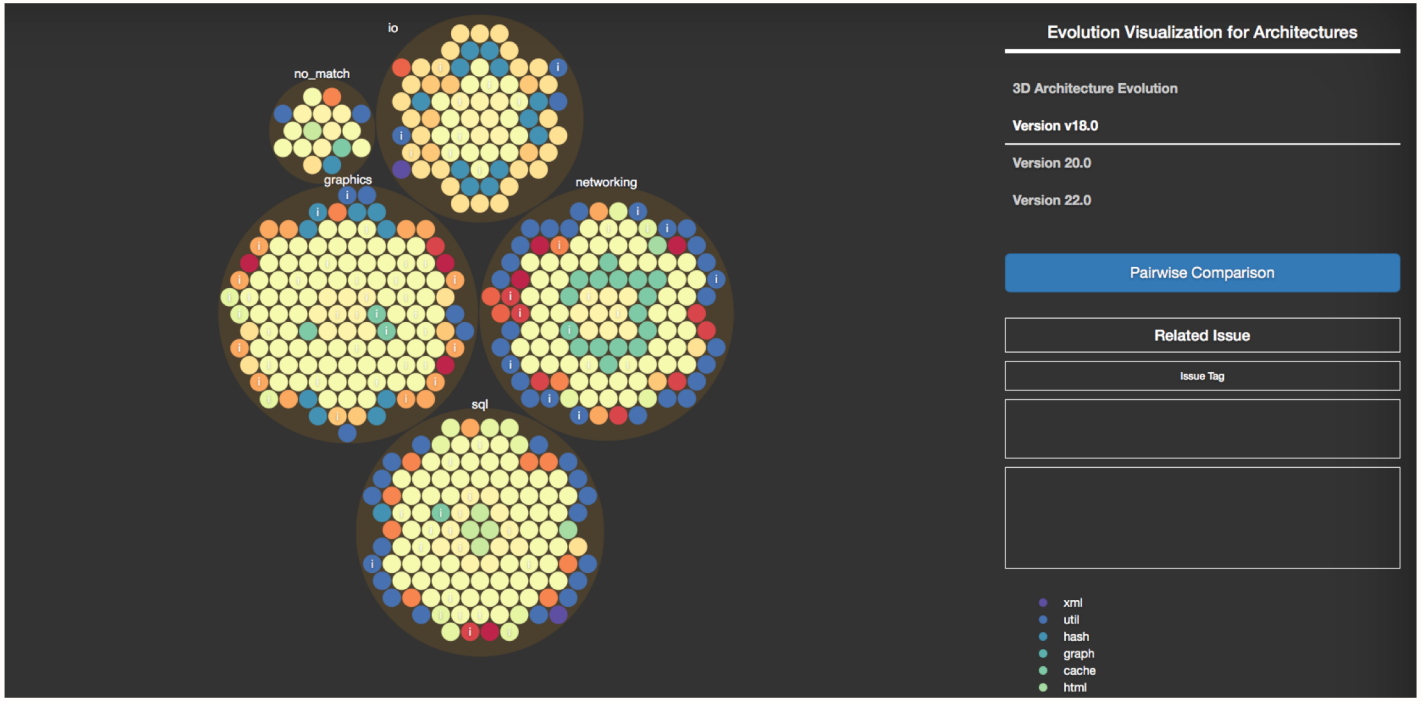

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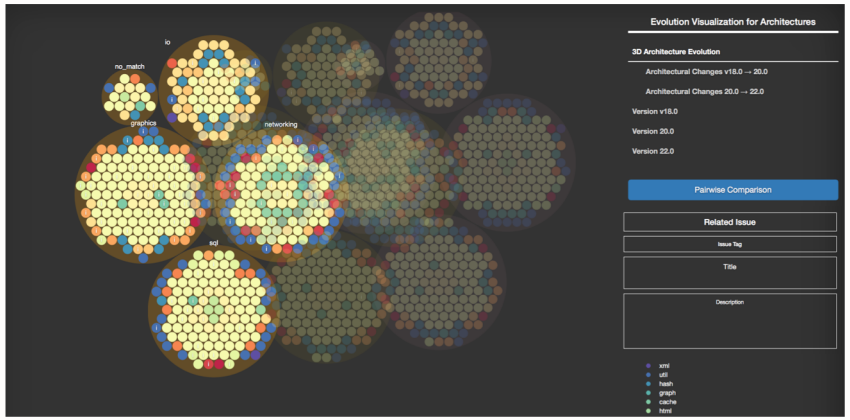
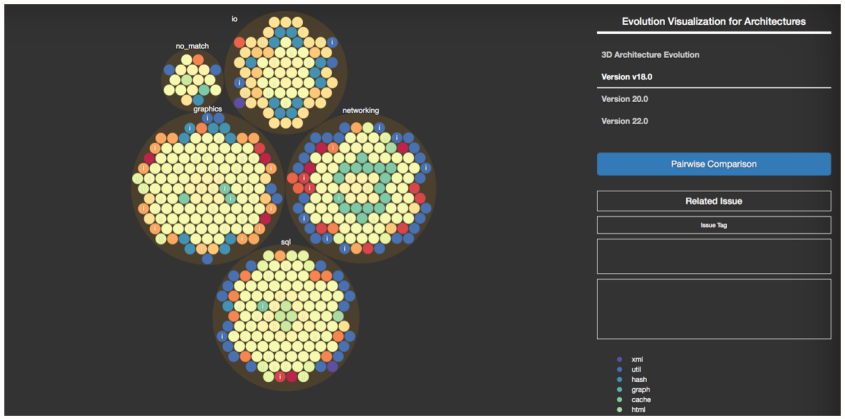
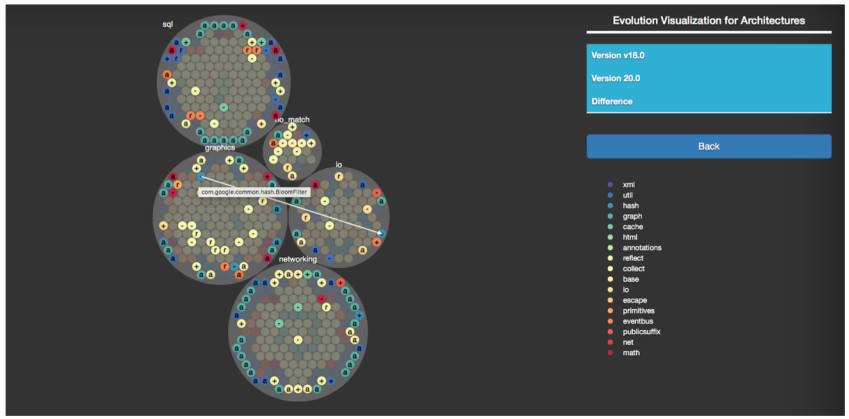
Visualization







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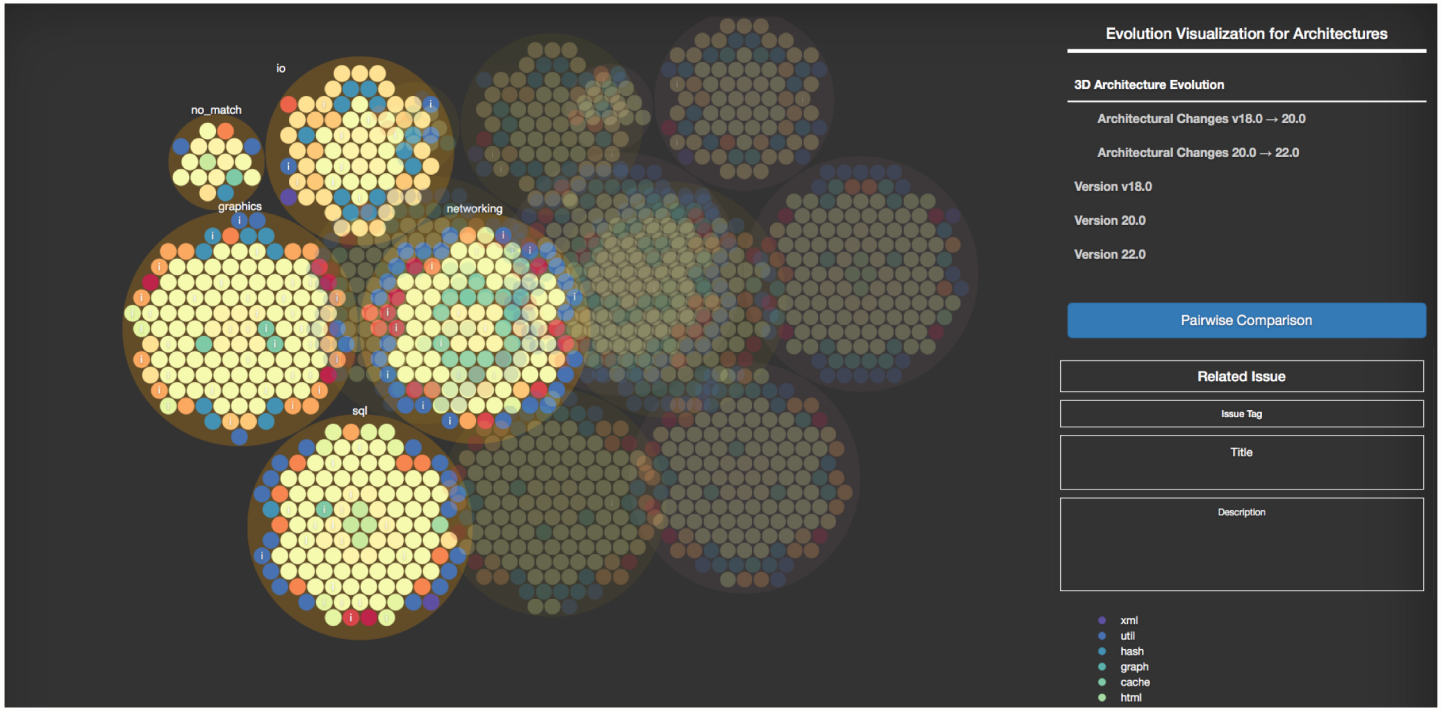
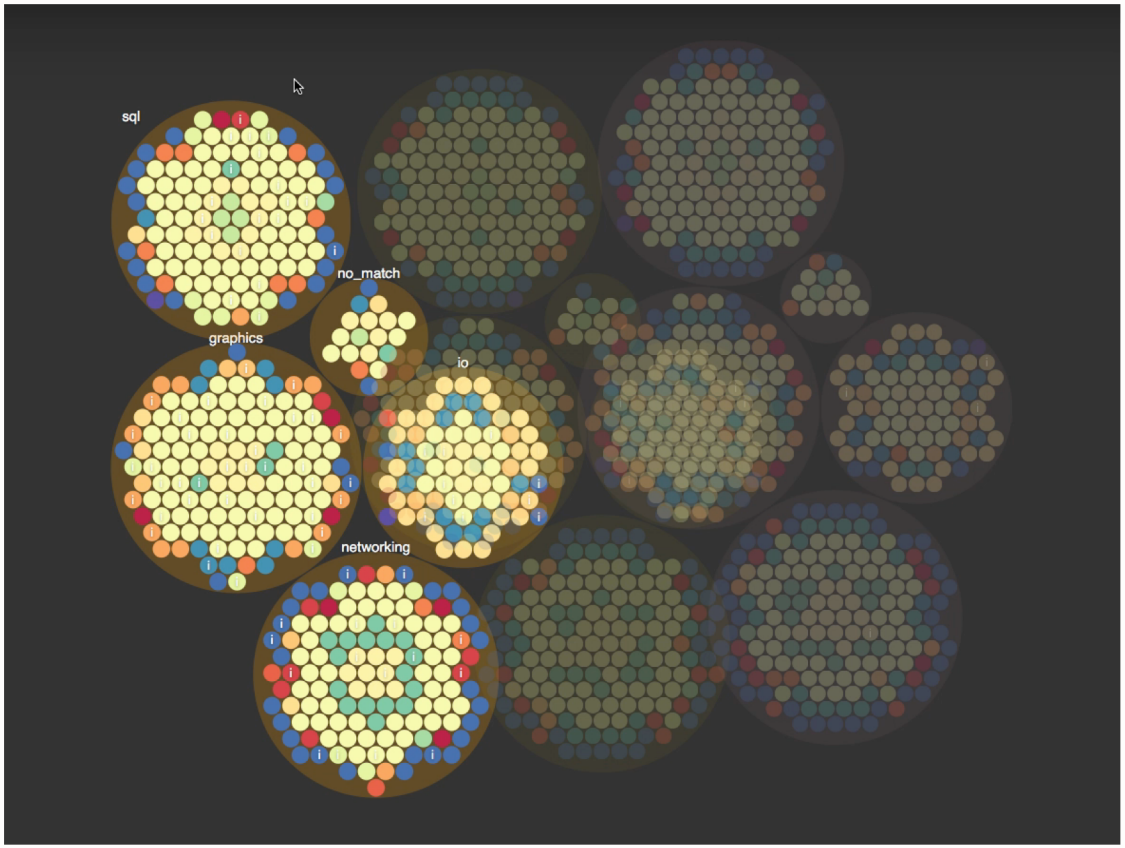
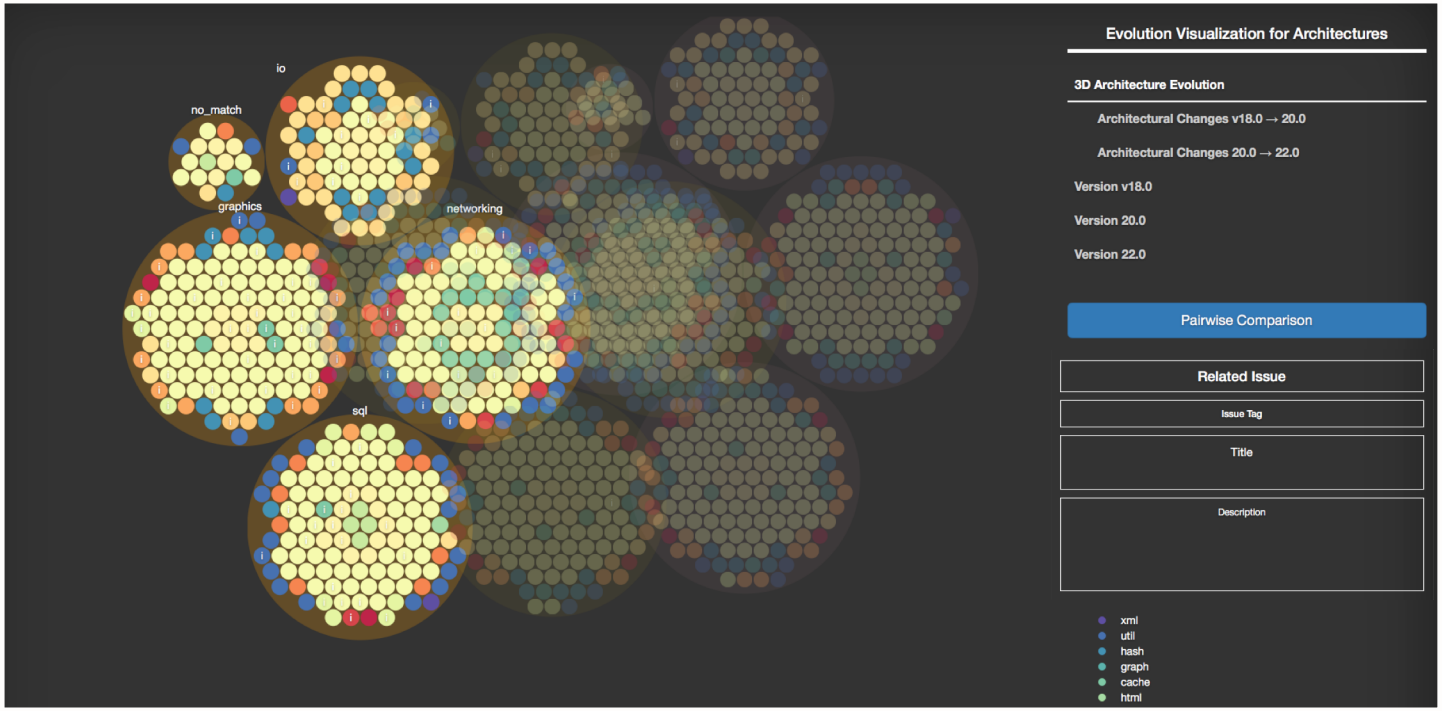


3-D Architecture-Evolution View

Visualization

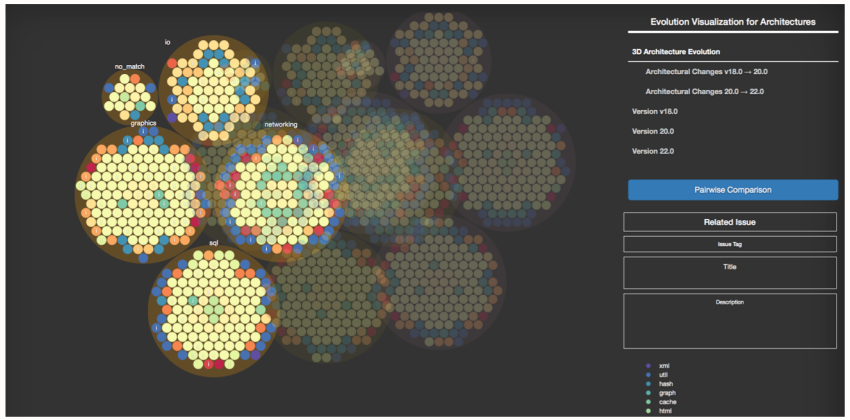


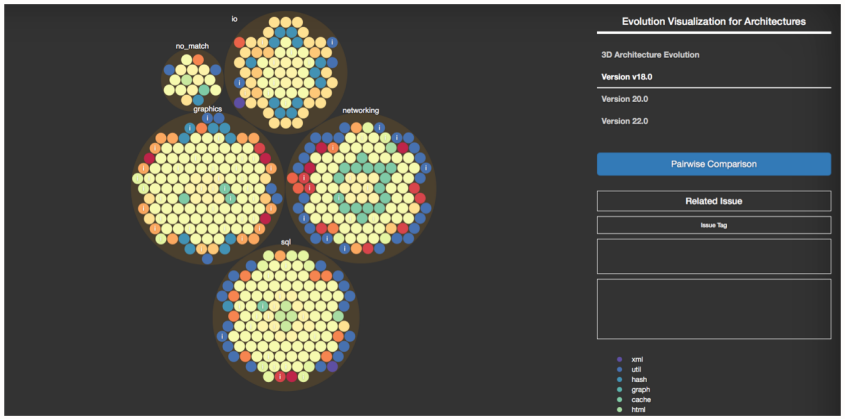
Visualization

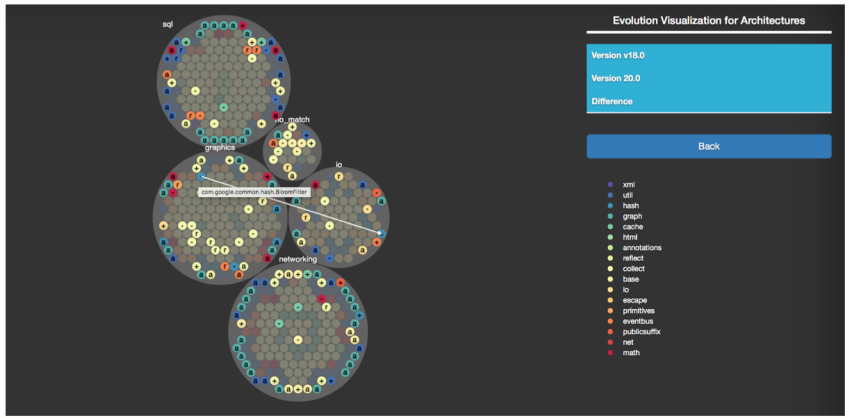


3-D Architecture-Evolution View

Visualization







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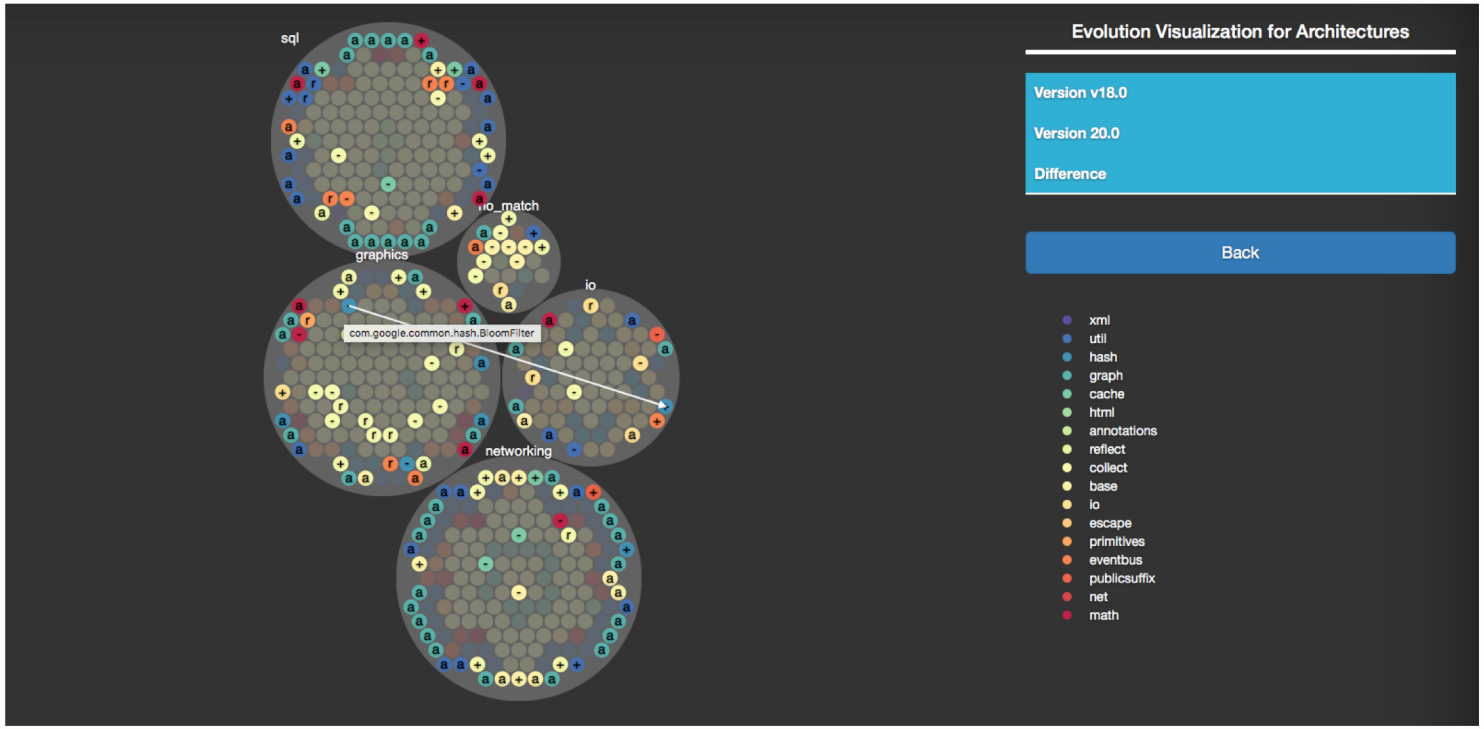
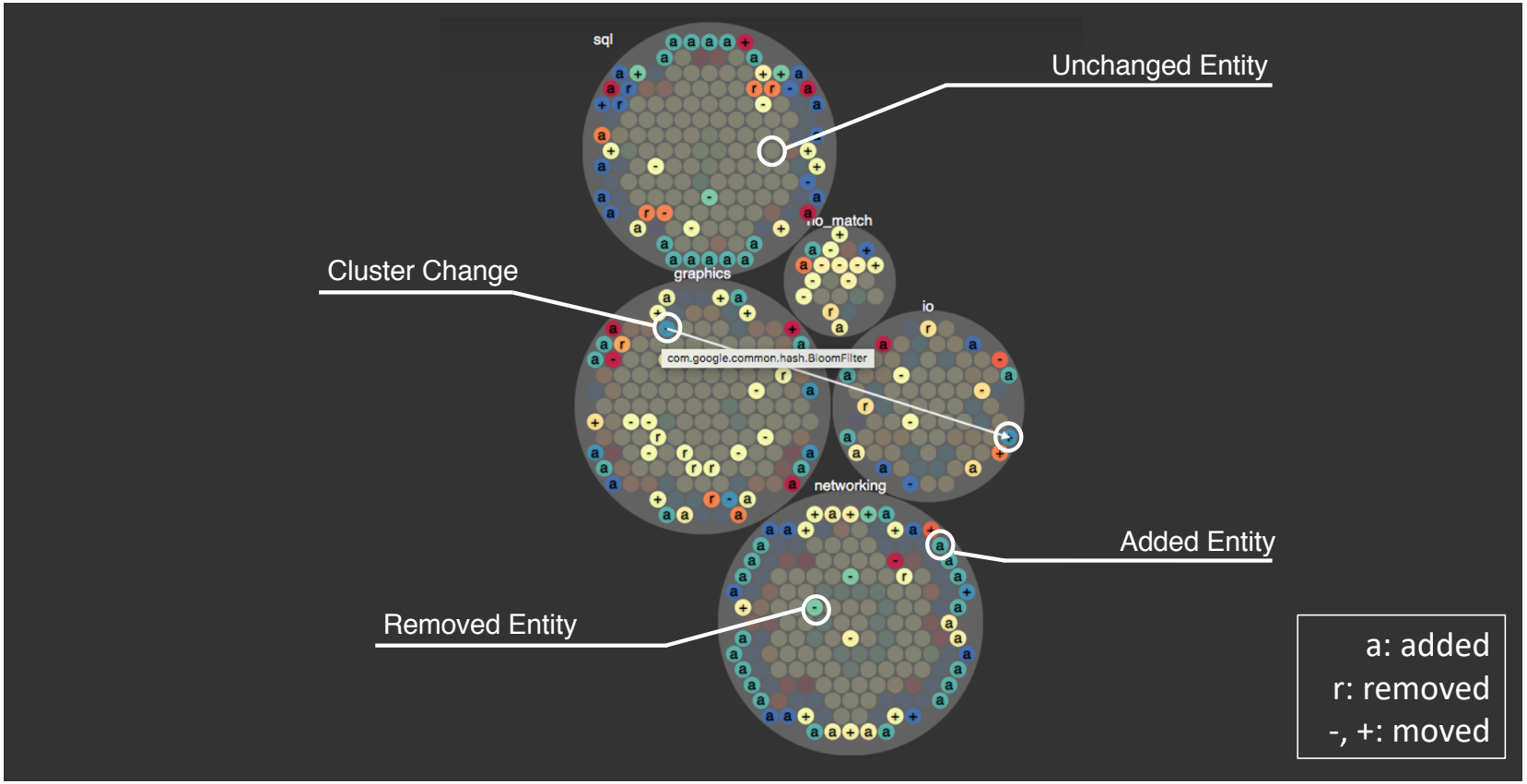


Pairwise Architecture-Comparison View

Visualization



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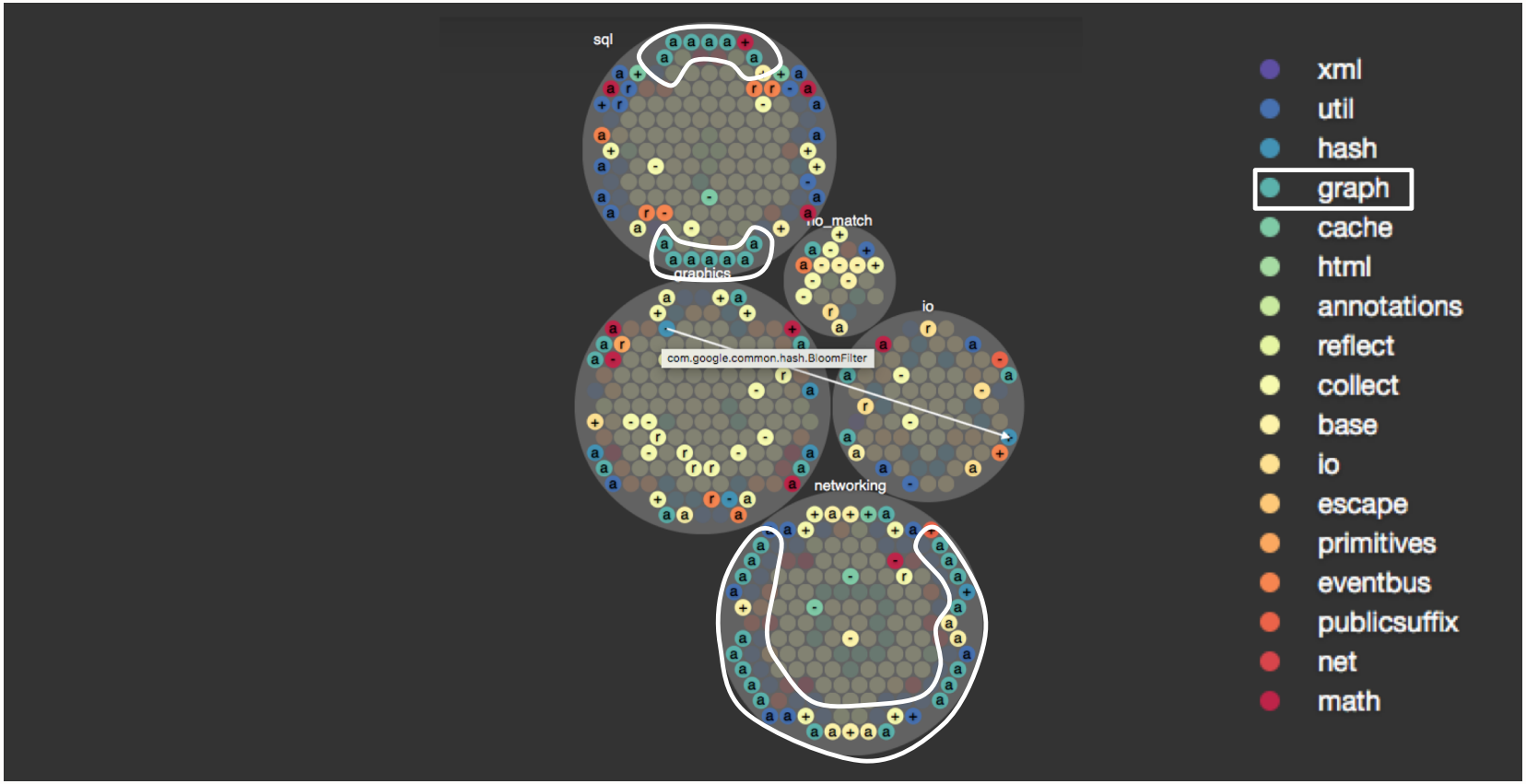

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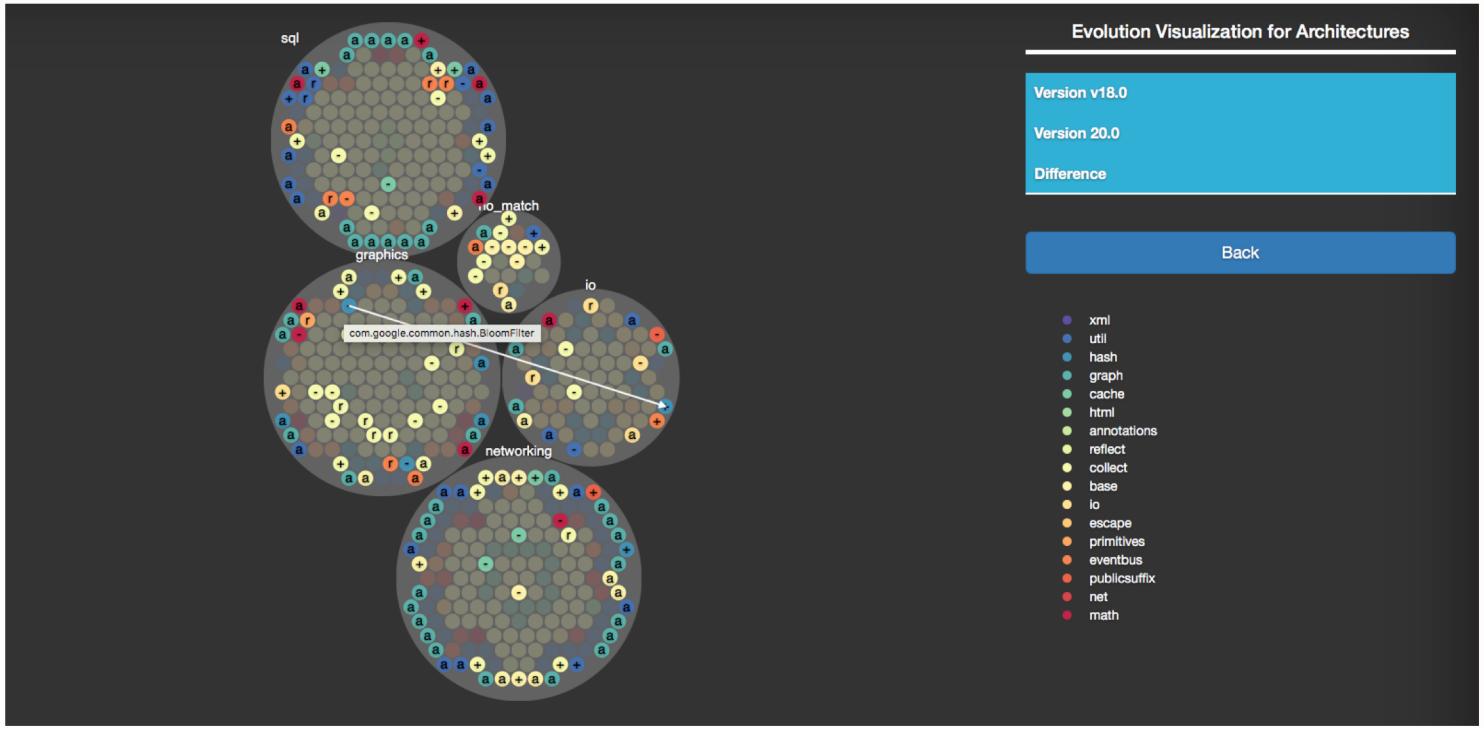
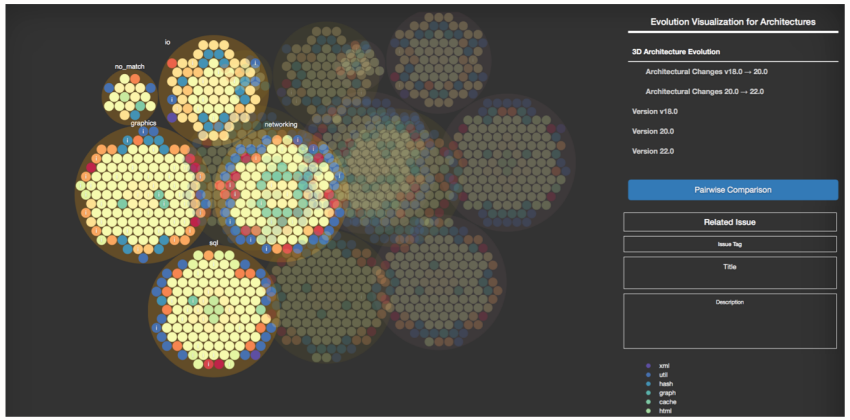
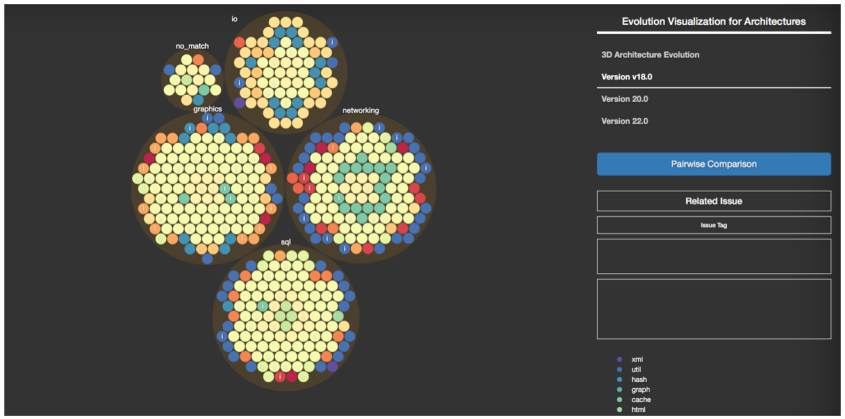
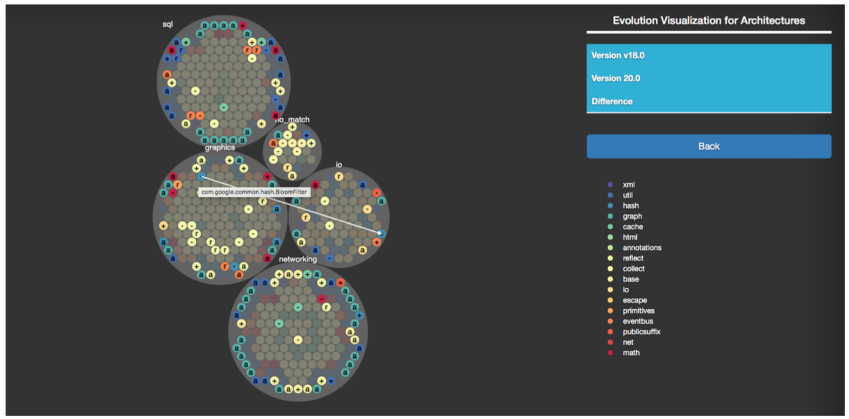


Pairwise Architecture-Comparison View

Visualization







Demo 1

Guava (version v18.0, 20.0, 22.0)

Demo 2

Guava (version v18.0, 20.0, 22.0)
With different perspective

Demo 3

Android Java API Framework
(version 6.0.0_r1, 7.0.0_r1)

Demo 3

System Apps
Dialer
Email
Calendar
Camera
. . .
Java API Framework
Content Providers
View System
Managers
Activity
Location
Package
Notification
Resource
Telephony
Window
Native C/C++ Libraries
Webkit
OpenMAX AL
Libc
Media Framework
OpenGL ES
. . .
Android Runtime
Android Runtime (ART)
Core Libraries
Hardware Abstraction Layer (HAL)
Audio
Bluetooth
Camera
Sensors
. . .
Linux Kernel
Drivers
Audio
Binder (IPC)
Display
Keypad
Bluetooth
Camera
Shared Memory
USB
WiFi
Power Management

Demo 3

Android Java API Framework
(version 6.0.0_r1, 7.0.0_r1)

Download

https://github.com/namdy0429/EVA

Conclusion

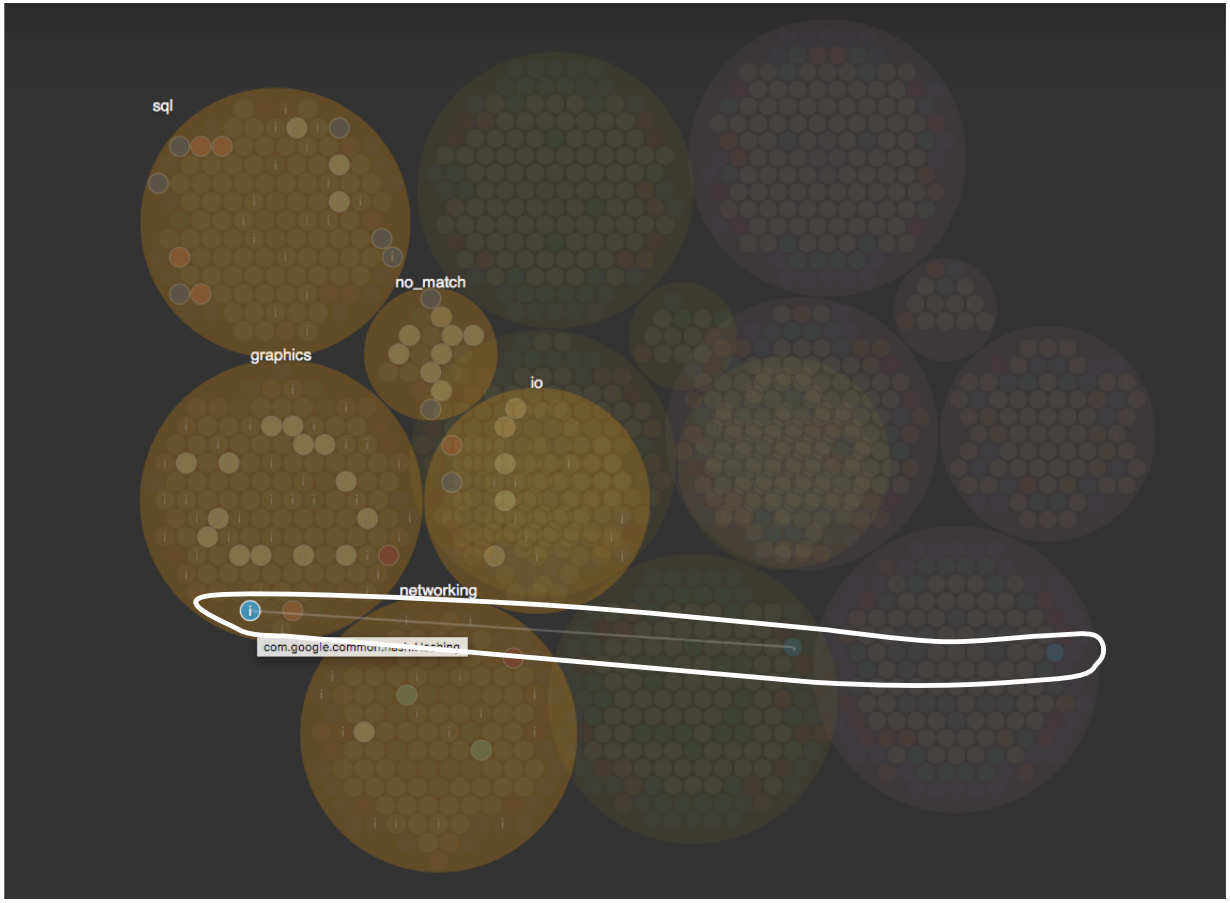
Summary

- EVA visualizes multiple facets of architectural evolution,
- EVA allows architectural exploration,
- EVA helps gauge the impact of design decision, and assess the stability

Future Work

- Update EVA for general use, deploy EVA to a development organization,
- Extend to provide additional information such as explicit rationales,
- Improve to identify architectural changes leading to technical debt.

THANK YOU

dayenam@usc.edu

Visualization