



# The Dependency Graph

Henry Liu

Gradle DPE Summit | Apple Inc. | 9/20/2023

# Agenda

Origins

The Dependency Graph

Developer Productivity Impact

The Infra Knowledge Graph

# Agenda

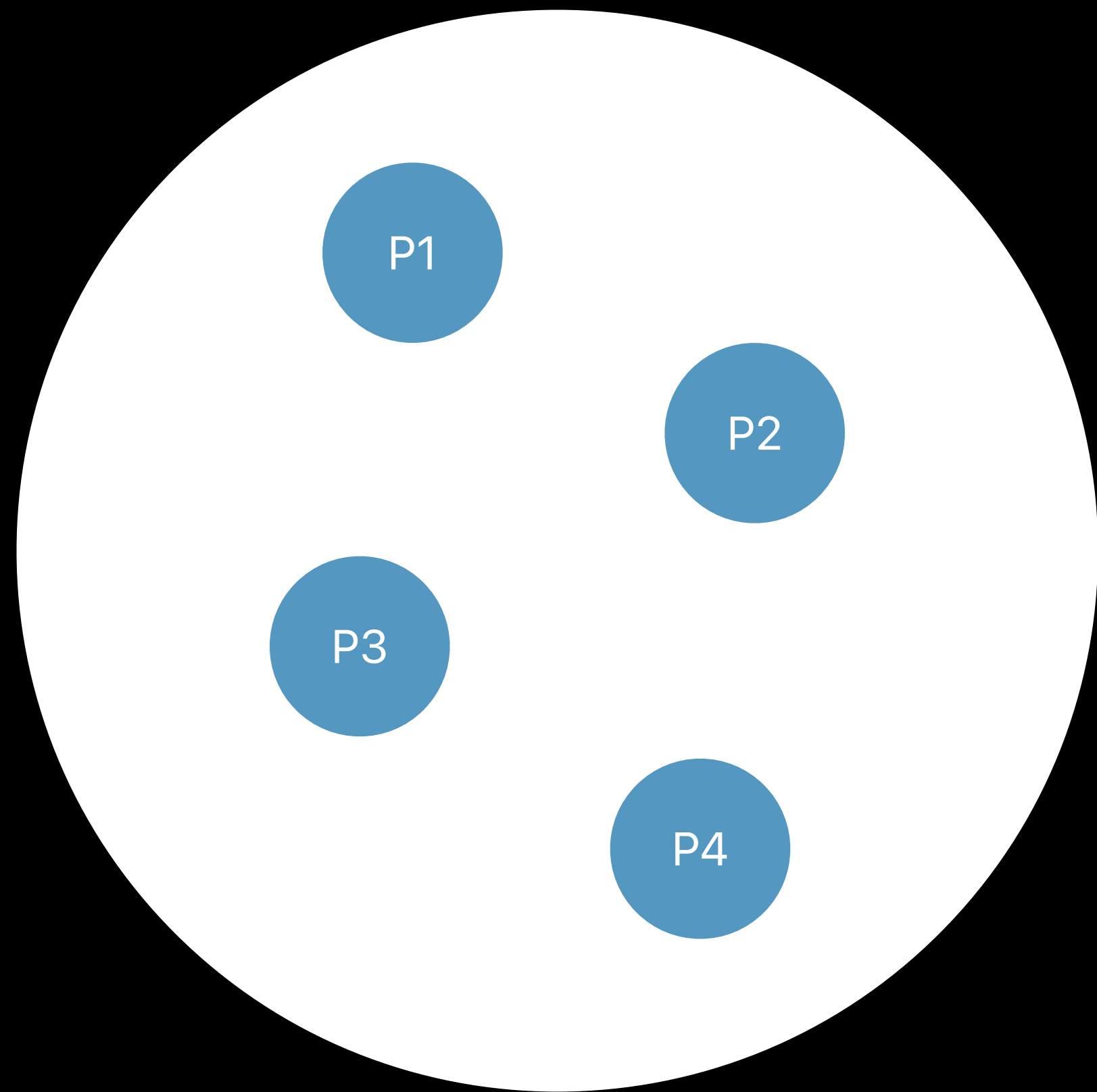
## Origins

The Dependency Graph

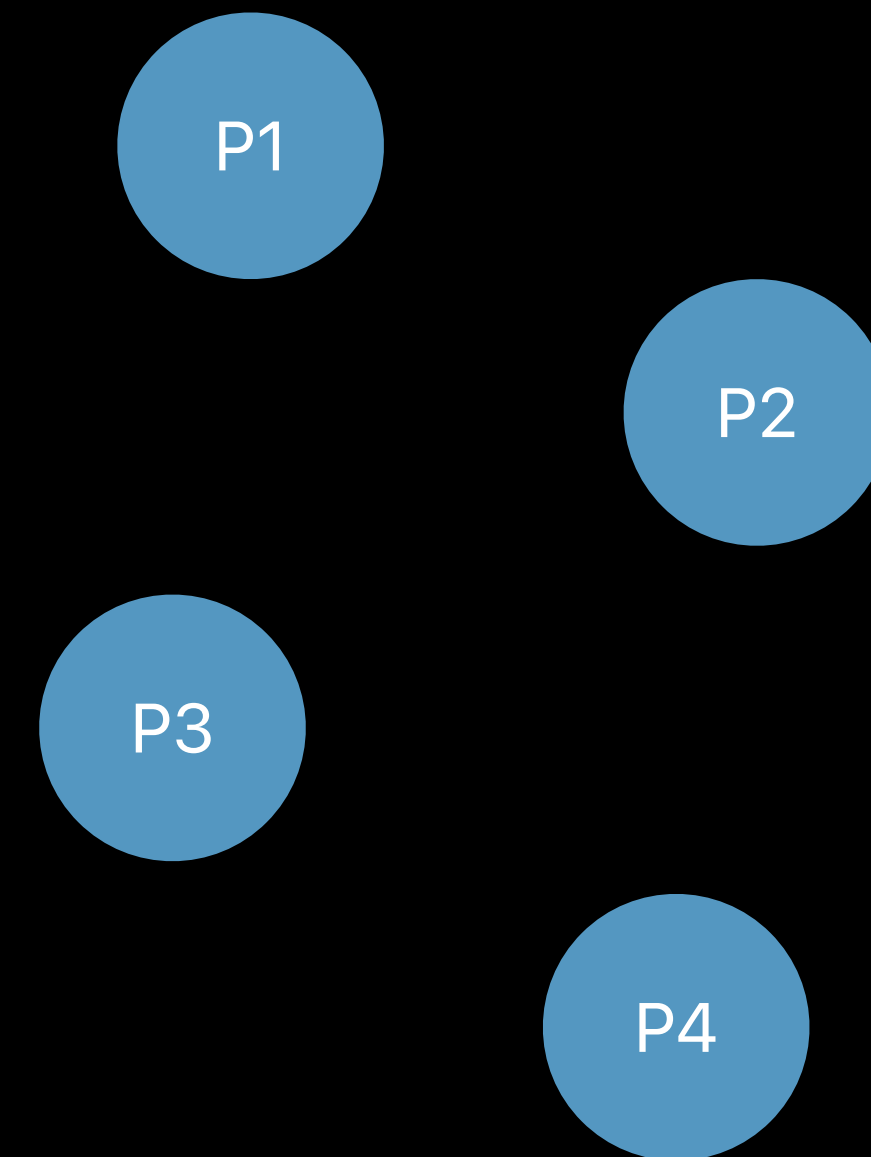
Developer Productivity Impact

The Infra Knowledge Graph

# Monorepo



# Multirepo





Dependency Hell



Developers

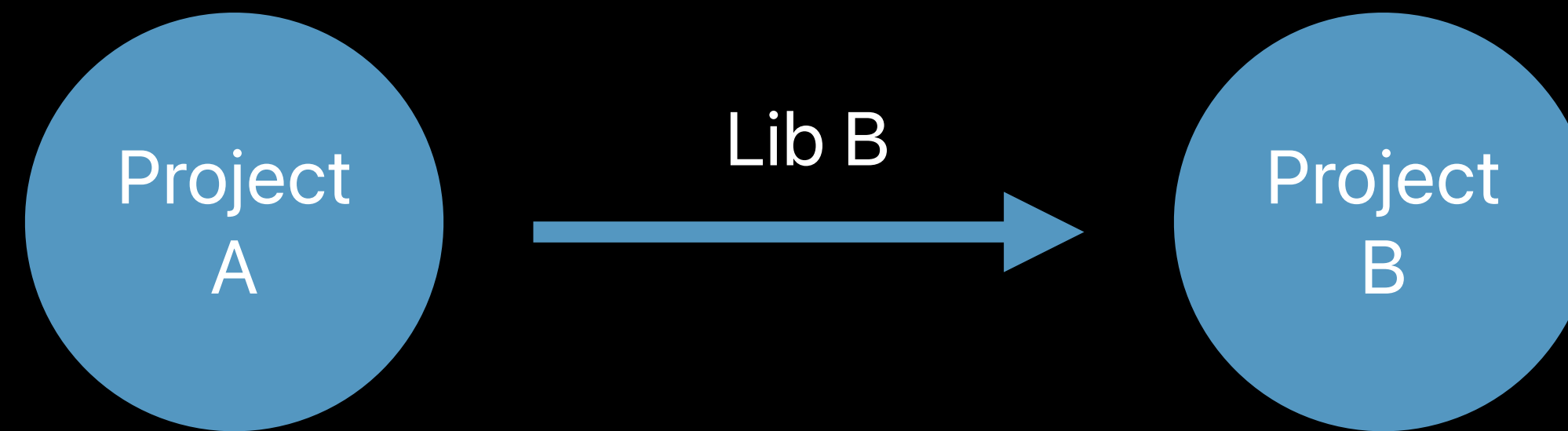
Origins

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# Software Dependency Graph



# Challenges

Lack of uniformity

Scale of rollout

Accurate, Up to Date, Complete



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Lack of uniformity

**Scale of rollout**

Accurate, Up to Date, Complete

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Lack of uniformity

Scale of rollout

Accurate, Up to Date, Complete

# Control Plane



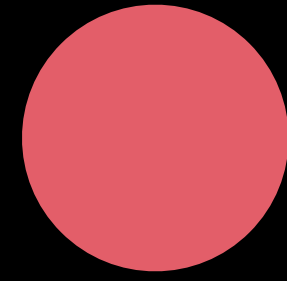
Unified Build

# Control Plane

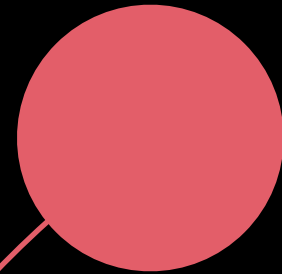


Unified Build

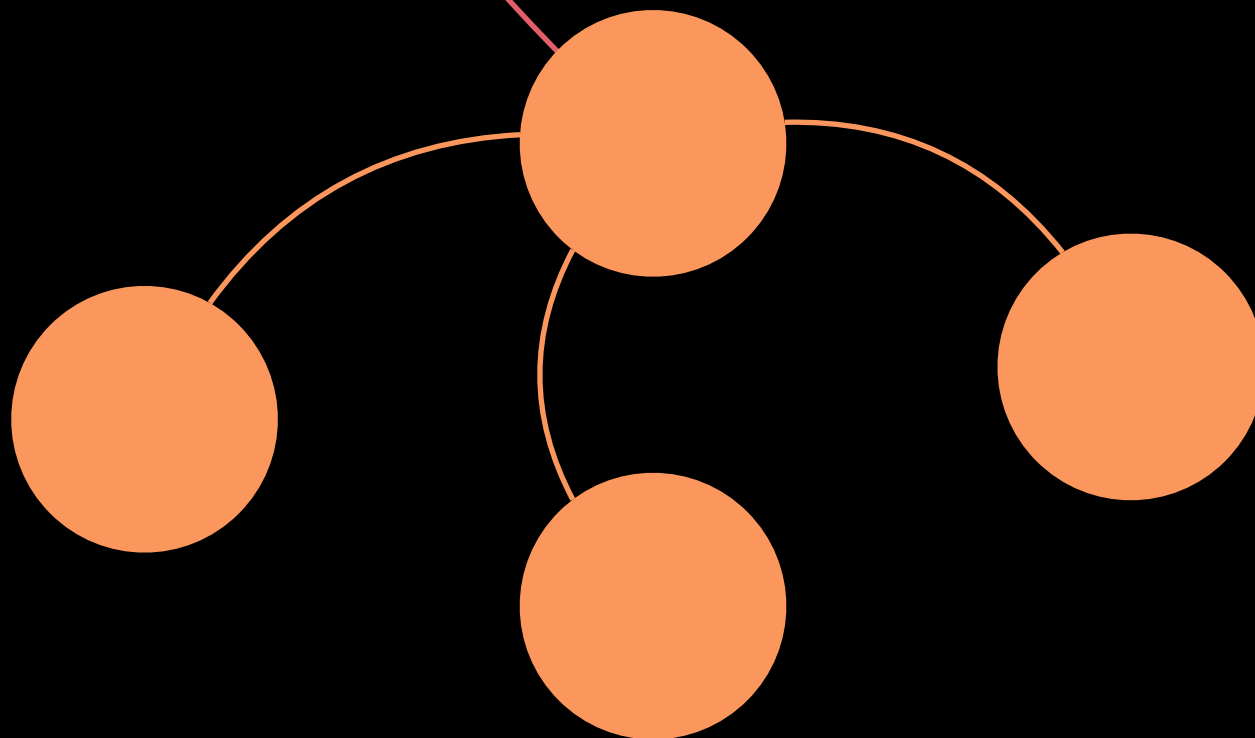
# Dependency Graph



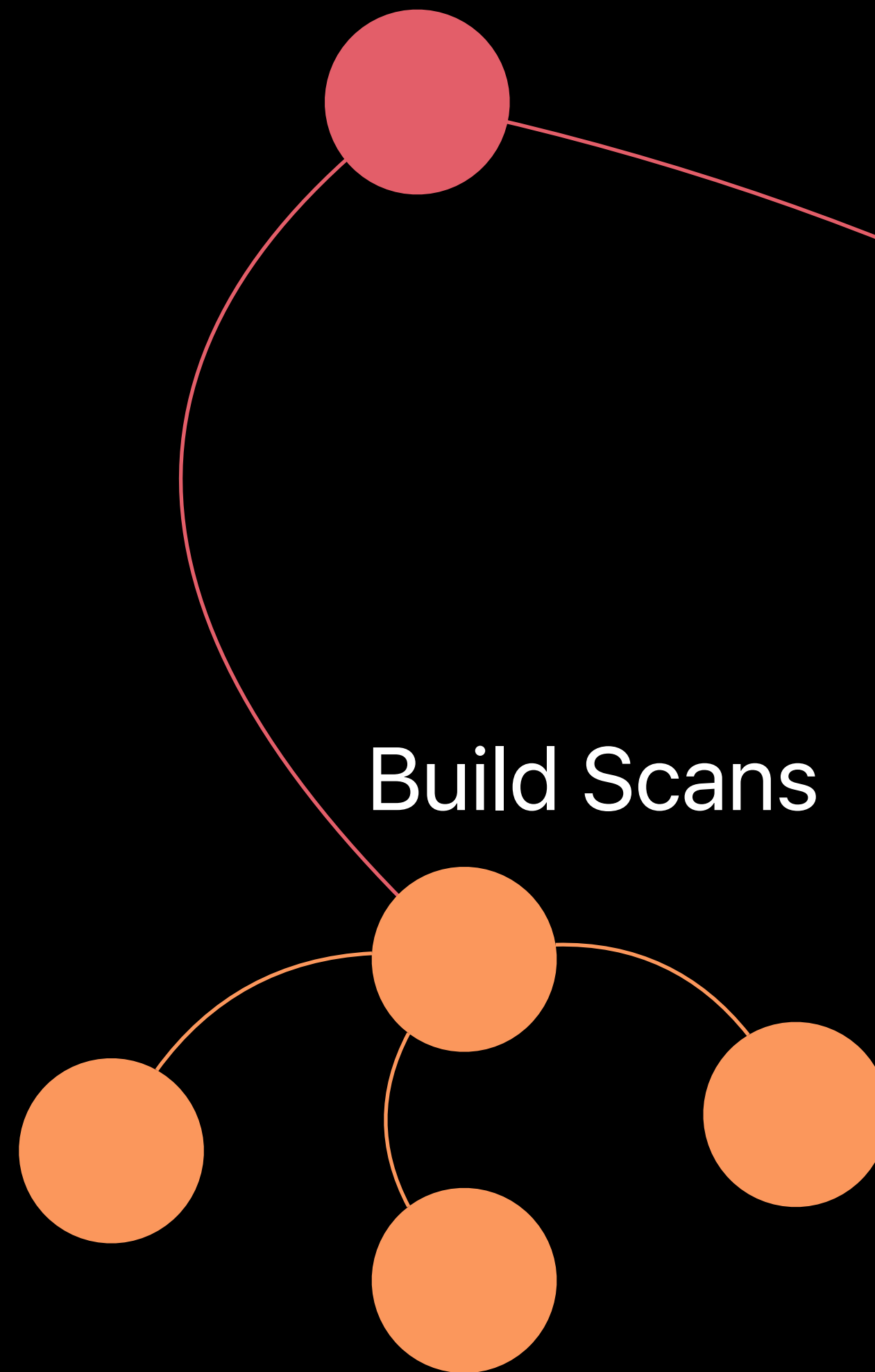
Dependency Graph



Build Scans

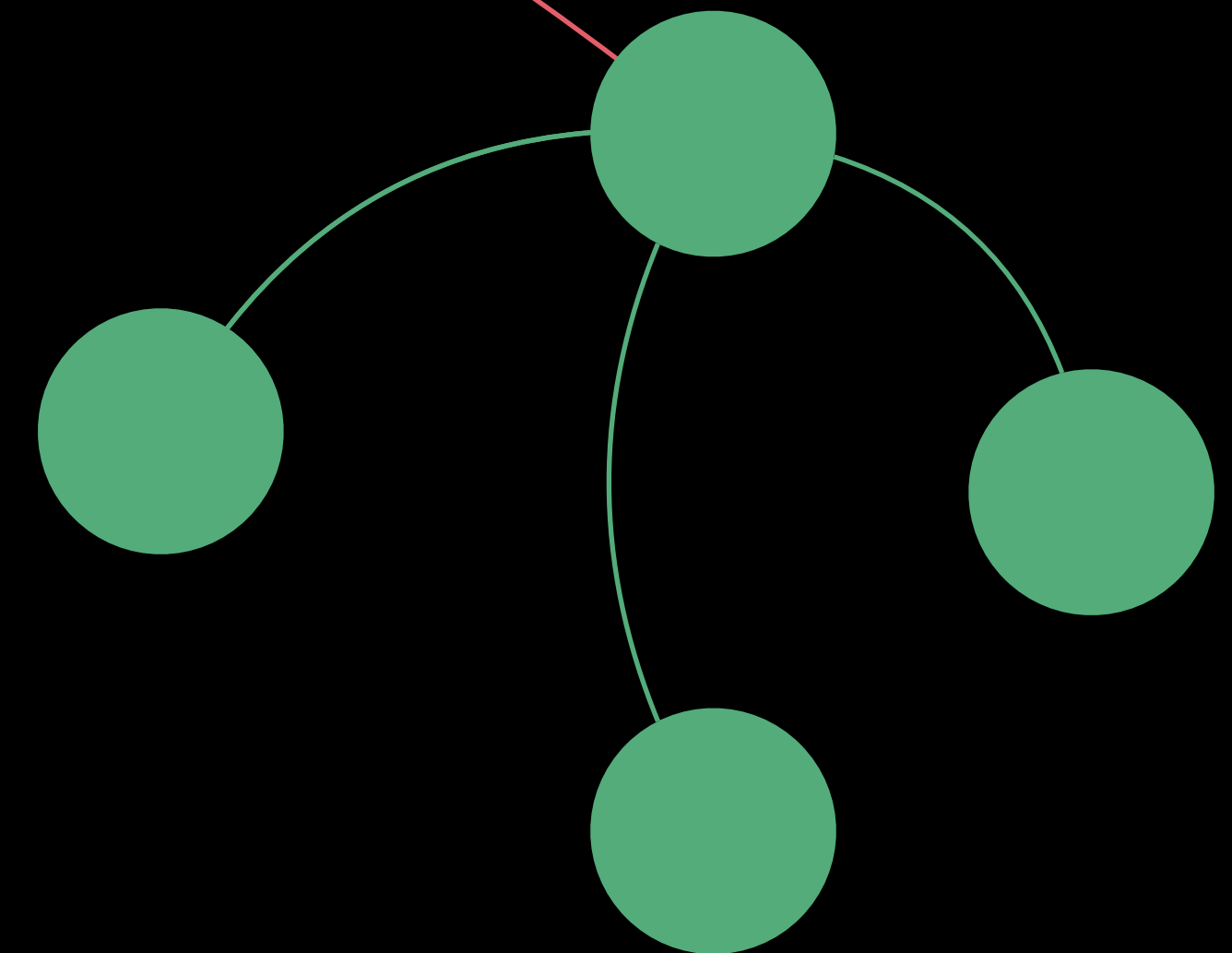


Dependency Graph

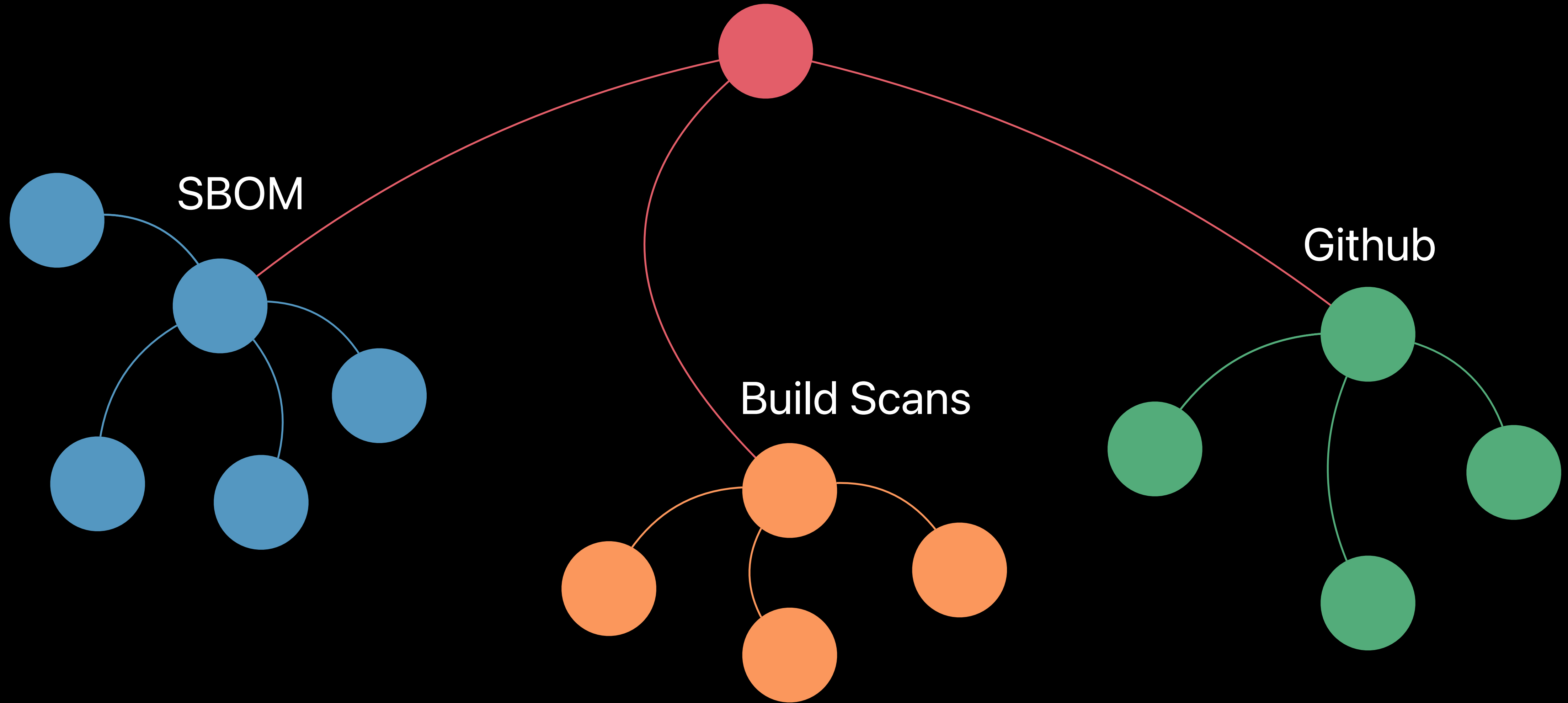


Build Scans

Github



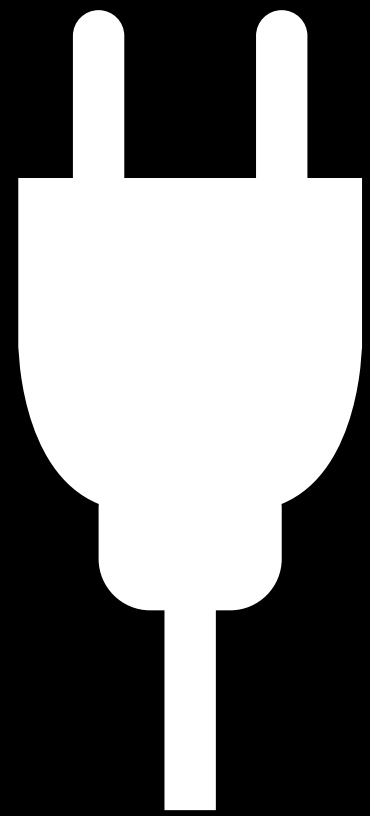
# Dependency Graph





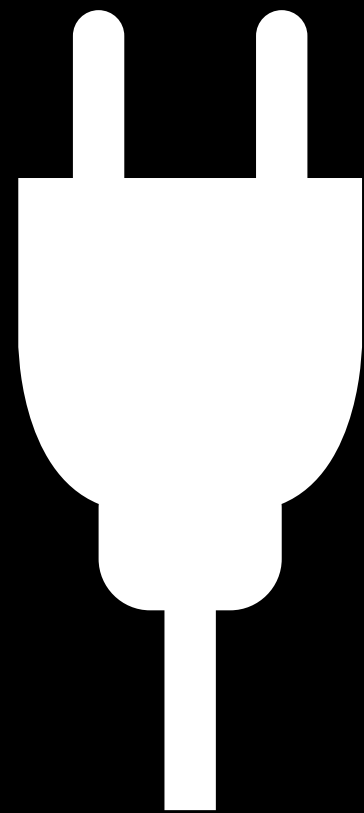
# Build Runtime Metadata

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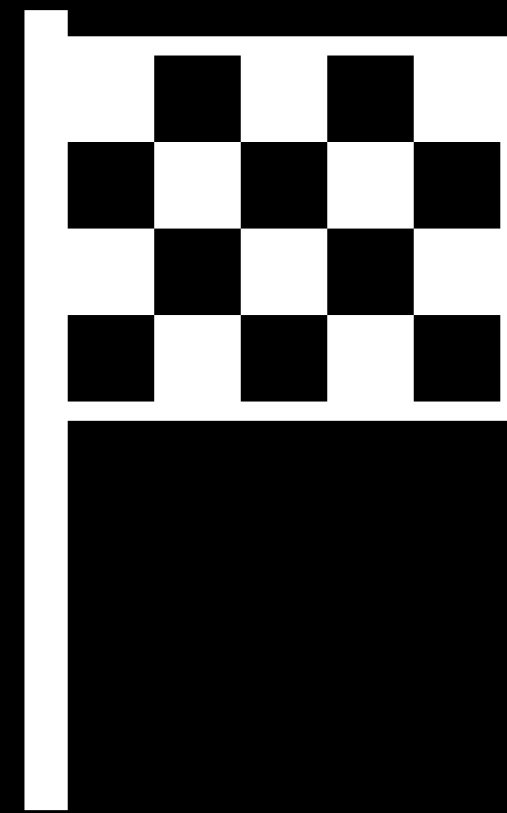


Plugins

# Build Runtime Metadata

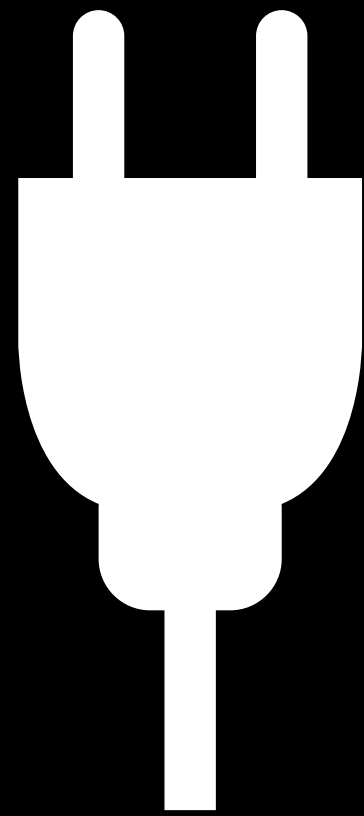


Plugins

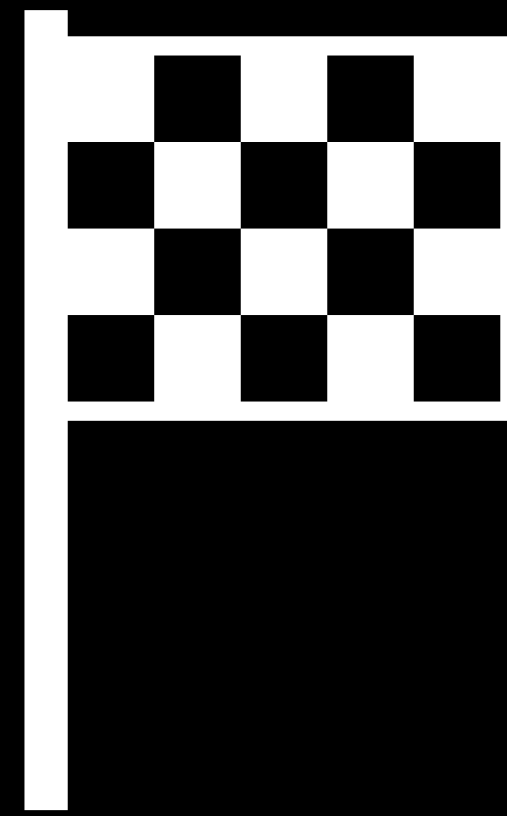


Conflict Resolution

# Build Runtime Metadata



Plugins



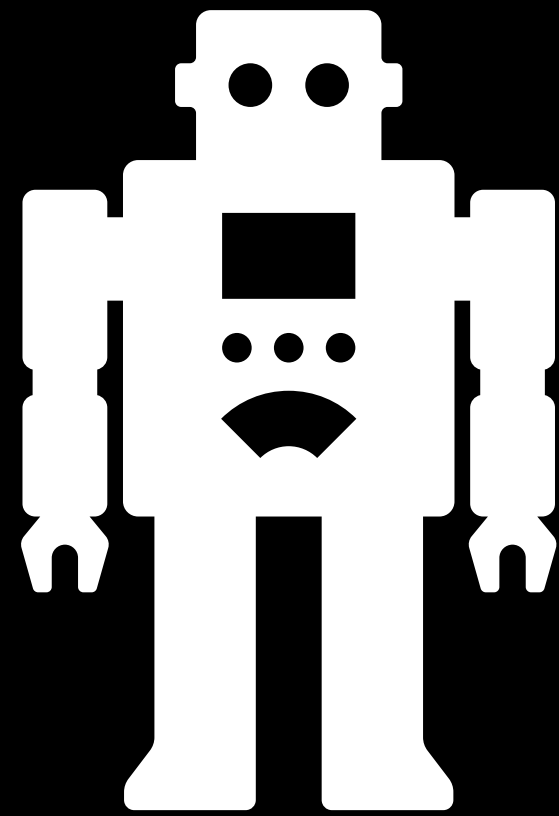
Conflict Resolution



Project Info

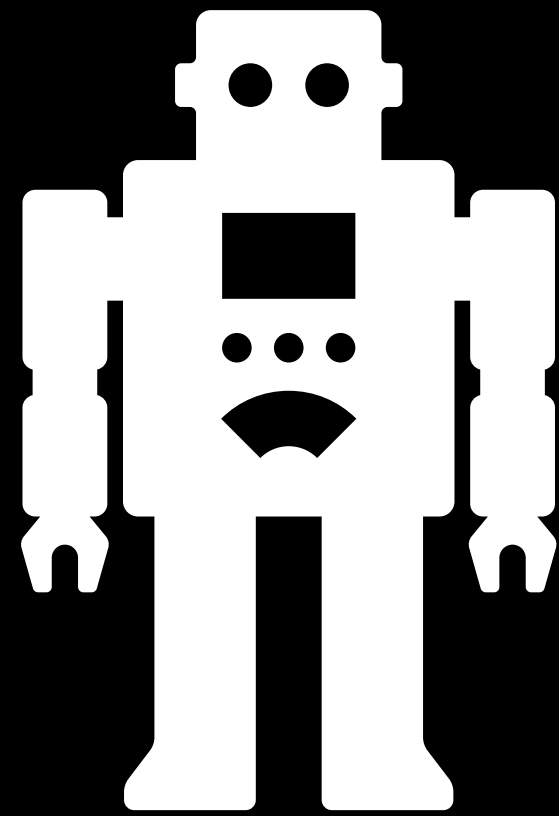
# Dependency Toolbox

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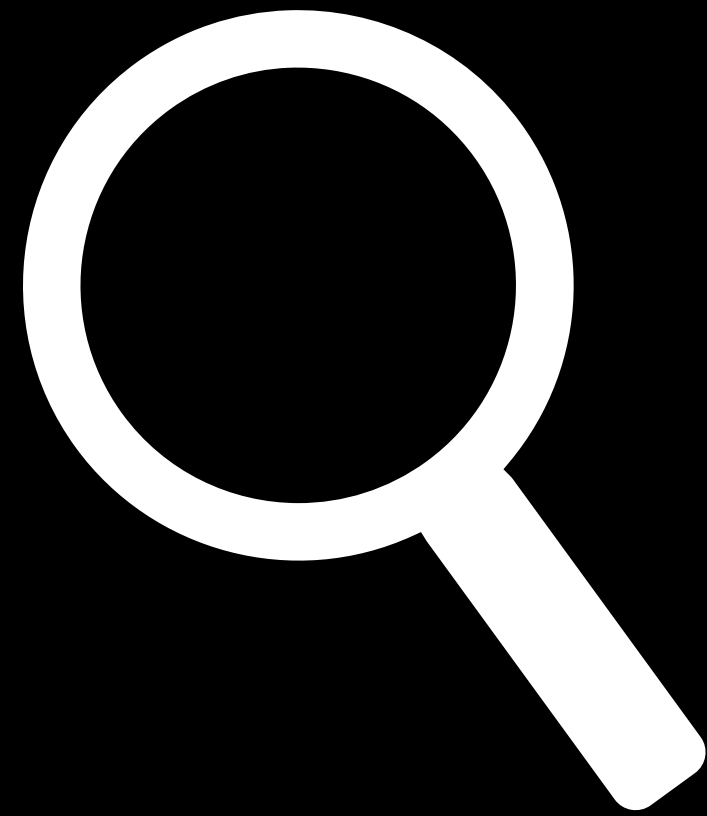


Automator

# Dependency Toolbox

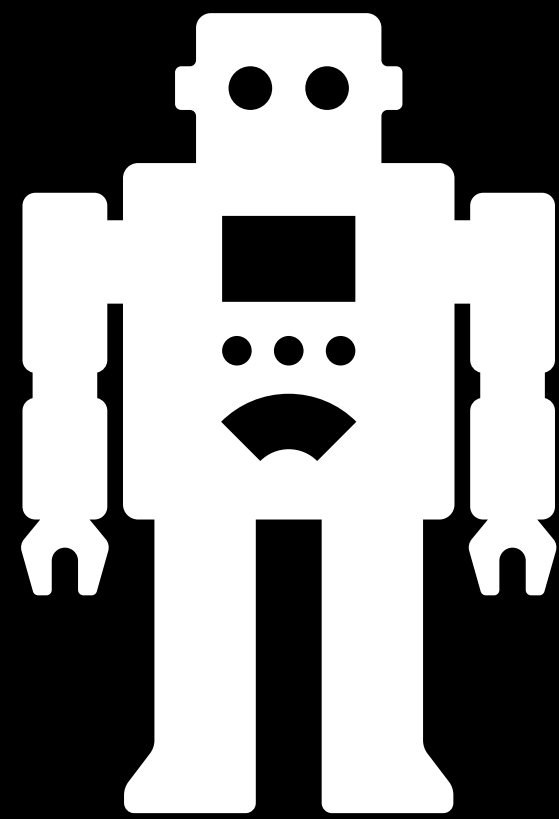


Automator

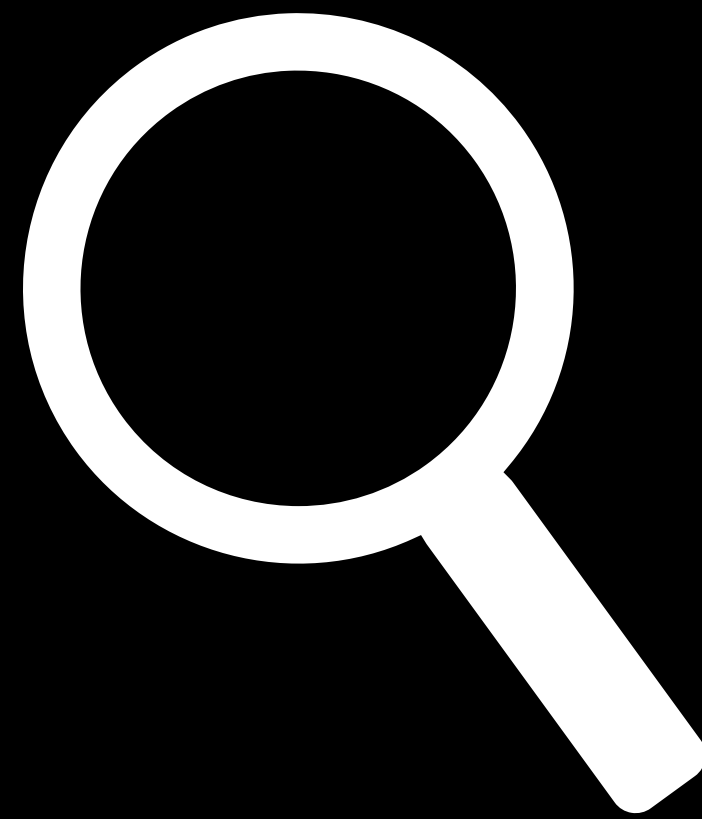


Analyzers

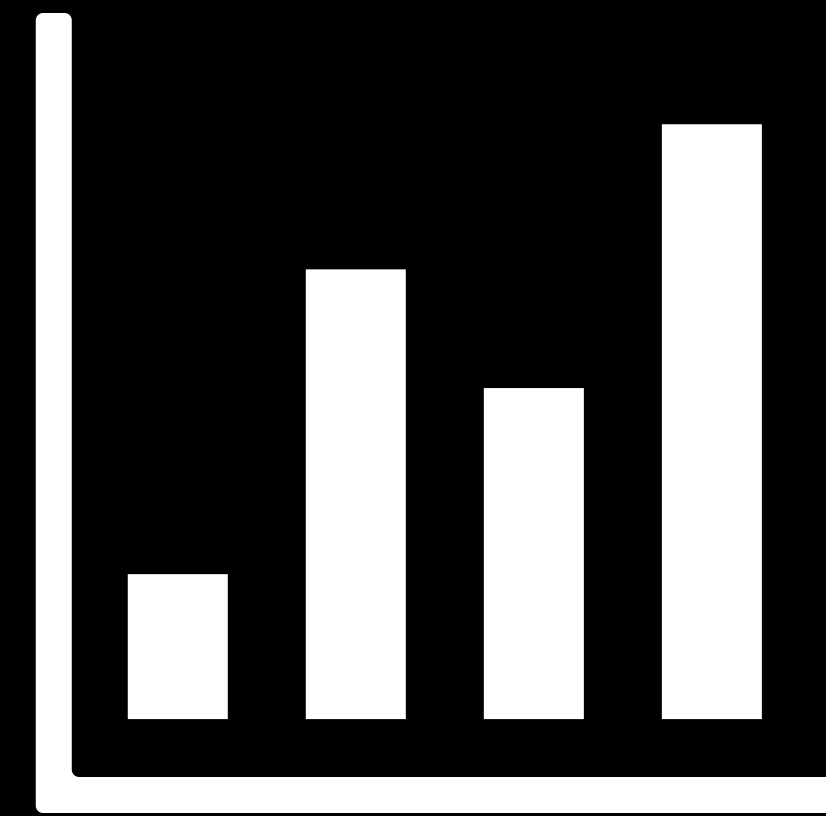
# Dependency Toolbox



Automator



Analyzers



Dashboards



Origins

The Dependency Graph

**Developer Productivity Impact**

The Infra Knowledge Graph

# Informed Decision Making

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Which projects utilize my library?

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Which projects utilize my library?

What versions of my library are in active use?

# Informed Decision Making

Which projects utilize my library?

What versions of my library are in active use?

Which project generates a specific library?

# Automated Dependency Updates

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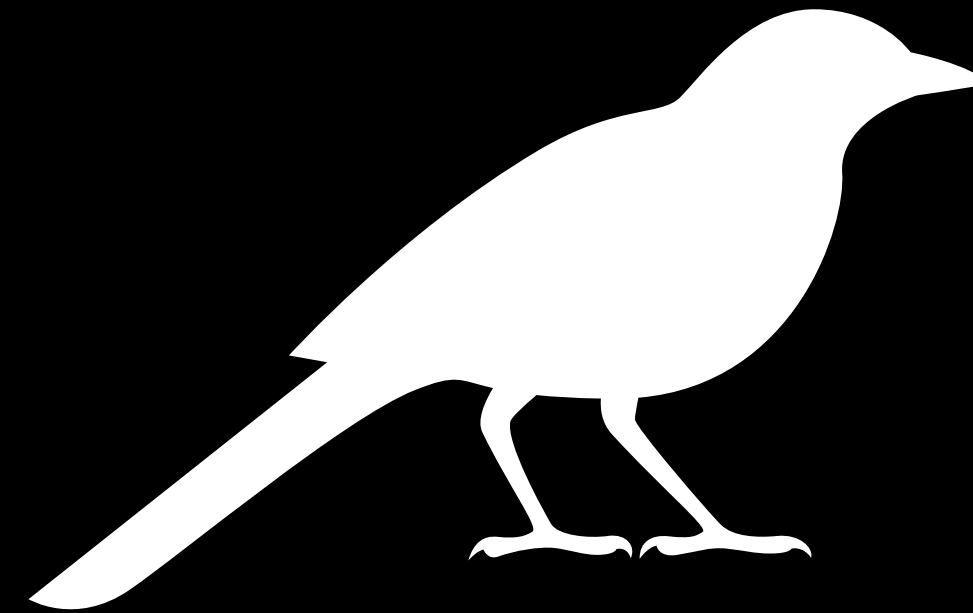


Code Maintenance

# Automated Dependency Updates



Code Maintenance



Canary Testing



# Software Upgrades

# Software Upgrades

75%

Day 1

Gradle Upgrades

# Software Upgrades

75%

Day 1

Gradle Upgrades

6

Months Shortened

Java Upgrades

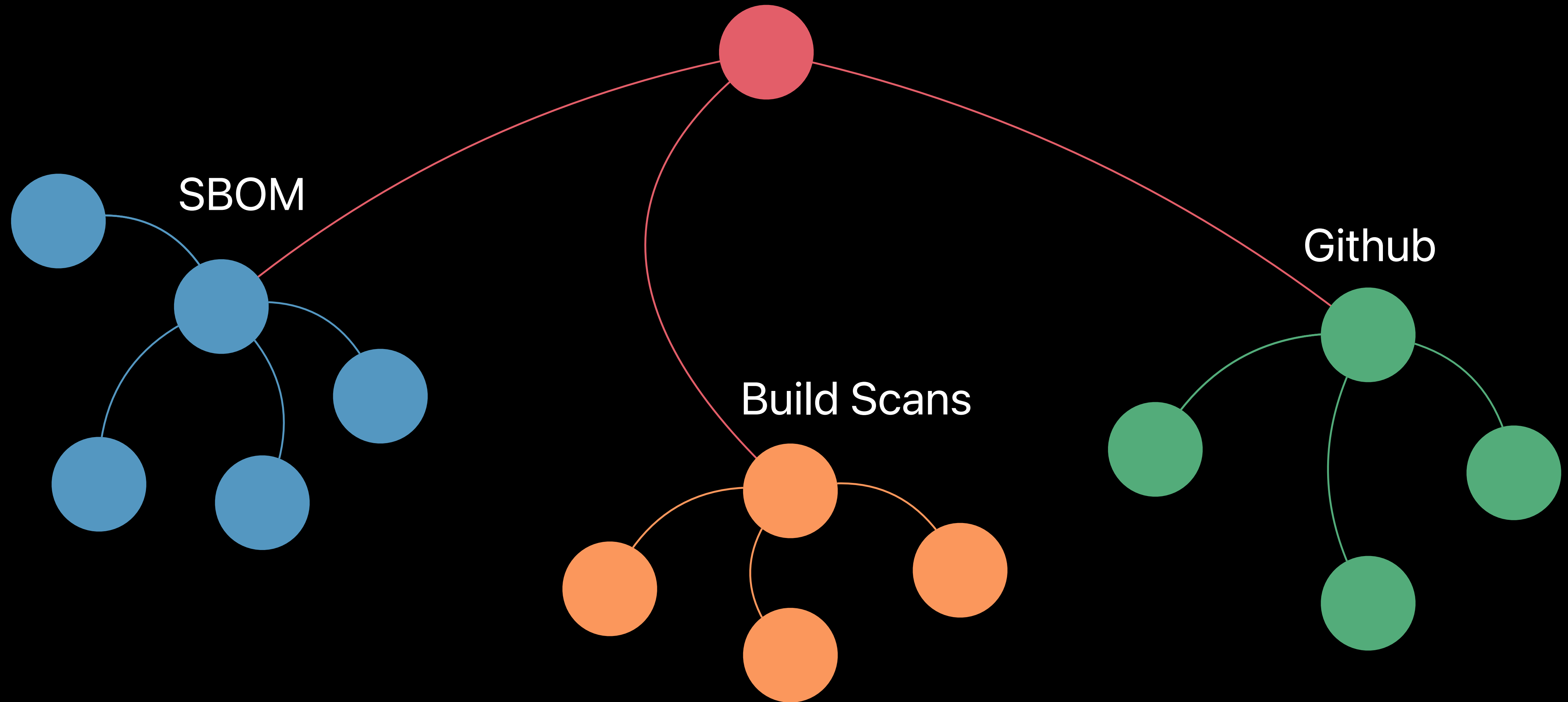
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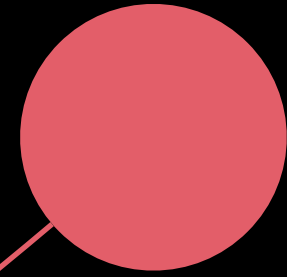
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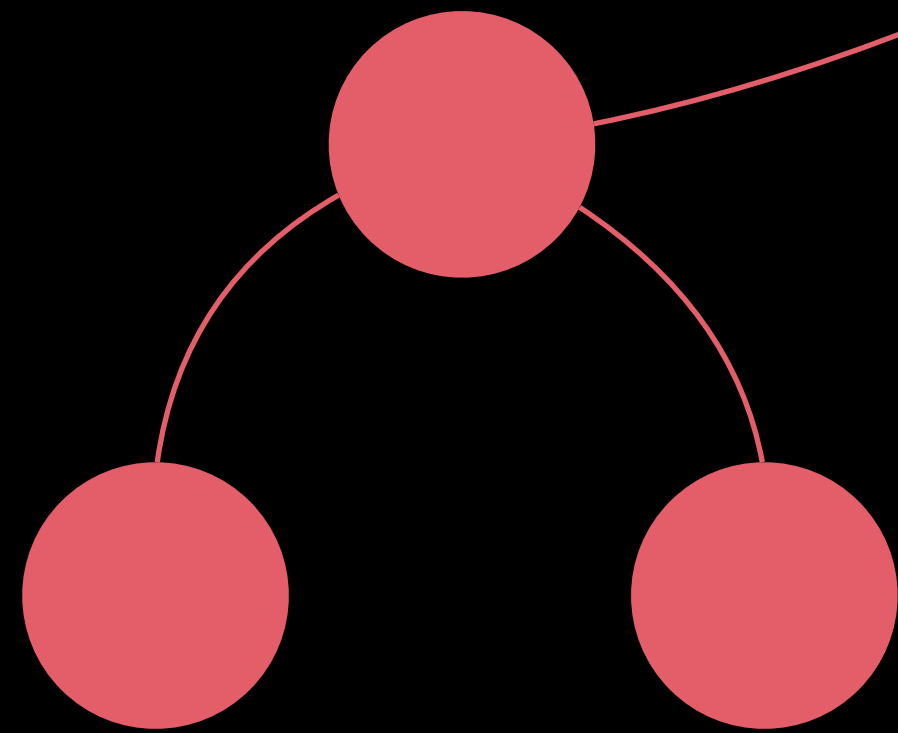
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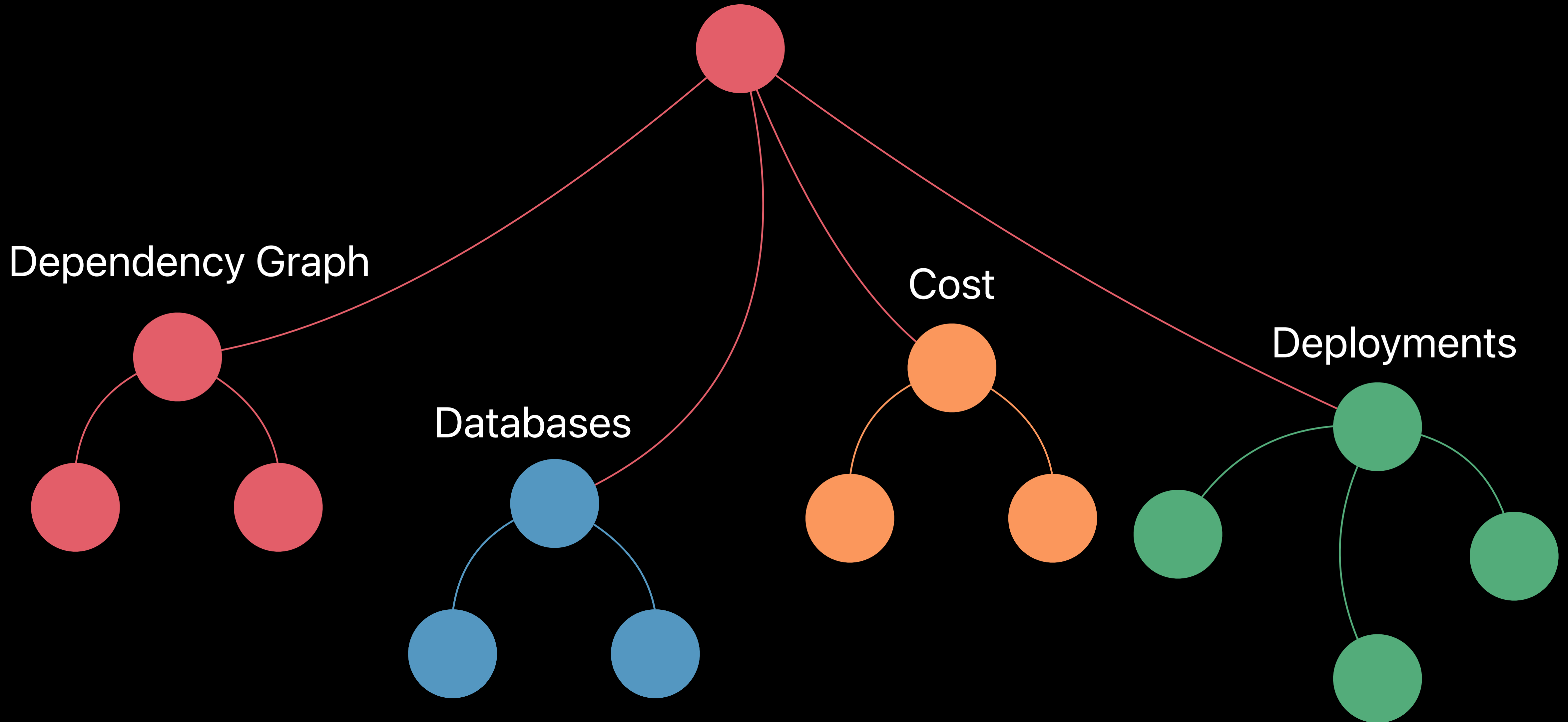
Infra Knowledge Graph



Dependency Graph



# Infra Knowledge Graph



# Key Lessons

Standardization

Control Plane

Global Visibility

Audit Trail

Treasure Chest of Metadata



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