

Building Server Platform with OSGi and Equinox

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Who am I?

- **Lead Engineer of SpringSource dm Server**
- **Author of Pro Spring**
- **JMX Expert Group member**



Agenda

- **Benefits of OSGi**
- **System Partitioning**
- **Managing Dependencies**
- **Extending Equinox**
- **Handling Concurrency**
- **Q&A**



Benefits of OSGi



System Partitioning

- **Manage complexity**
- **Handle large teams**
- **Mitigate risk**
- **Deal with change**
- **Deal with large codebase**



Dependency Management

- **Handle third-party dependencies**
- **Embody dependencies in design and code**
- **Manage different dependency versions**



Dynamism

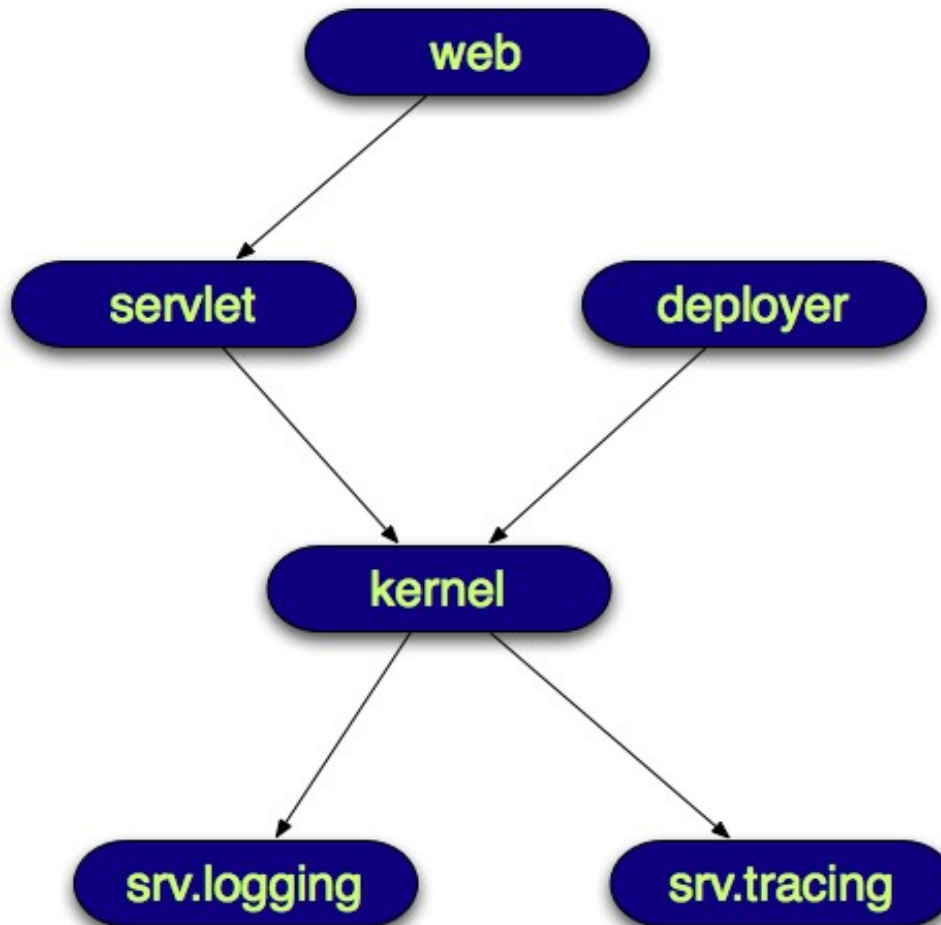
- **Support evolving runtime environment**
- **Handle failure gracefully**
- **Hot-deployment built-in**



System Partitioning

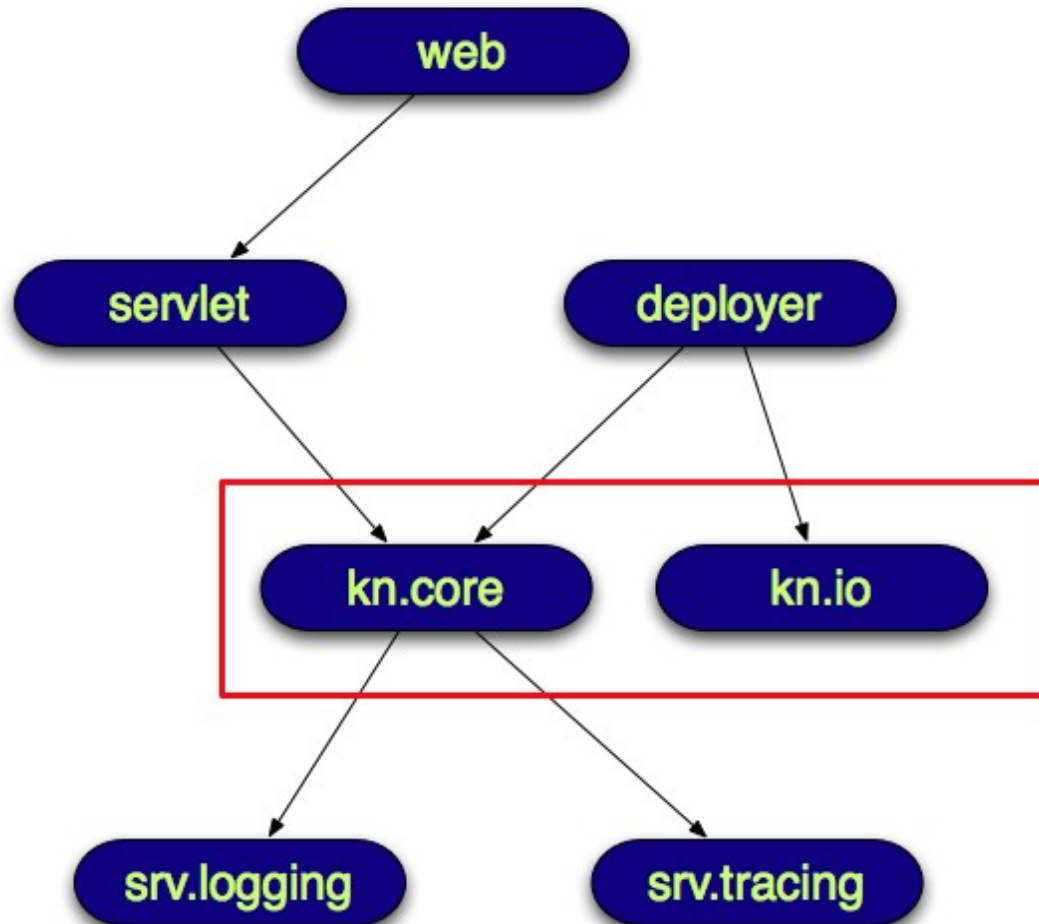


Start Simple – Logical Model





Extract Modules as Needed



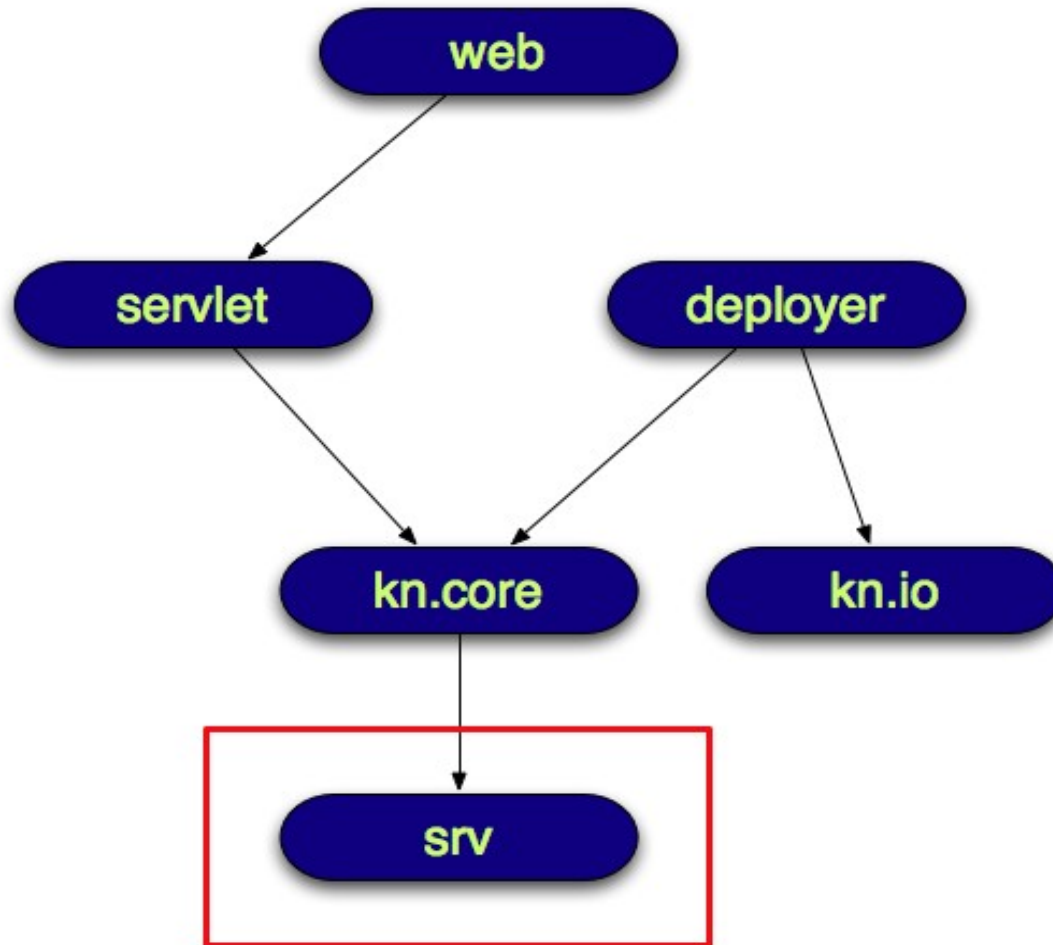


Reasons for Extraction

- **Area of risk**
- **Area of change**
- **Area of complexity**
- **Area of work assignment**
- **Unit of maintenance**
- **Code explosion**



Fold Modules Together as Needed





Reasons for Folding

- **Risk removal**
- **Code shrinking**
- **Team changes**
- **Complexity addressed**
- **Incorrect boundaries**

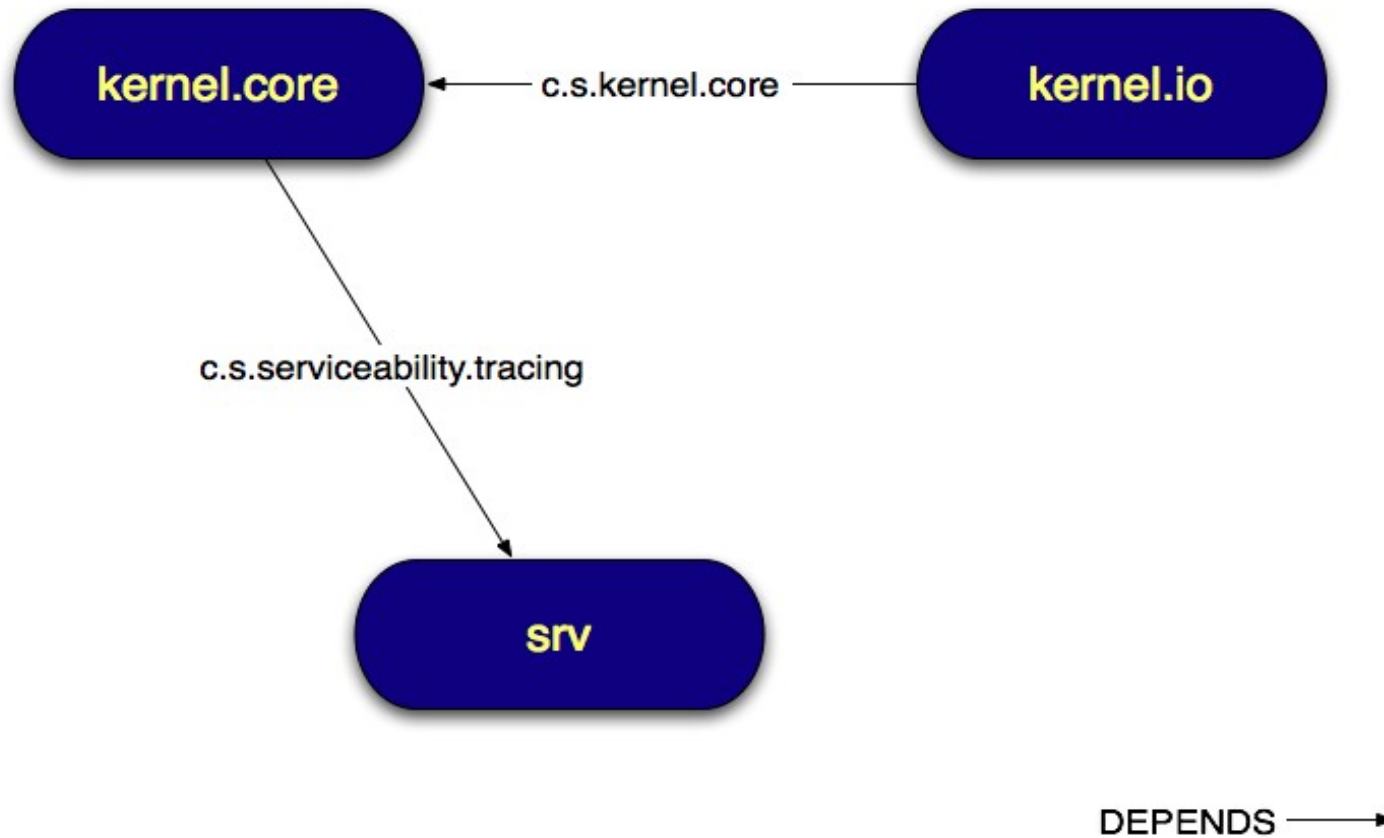


DEMO: Tooling



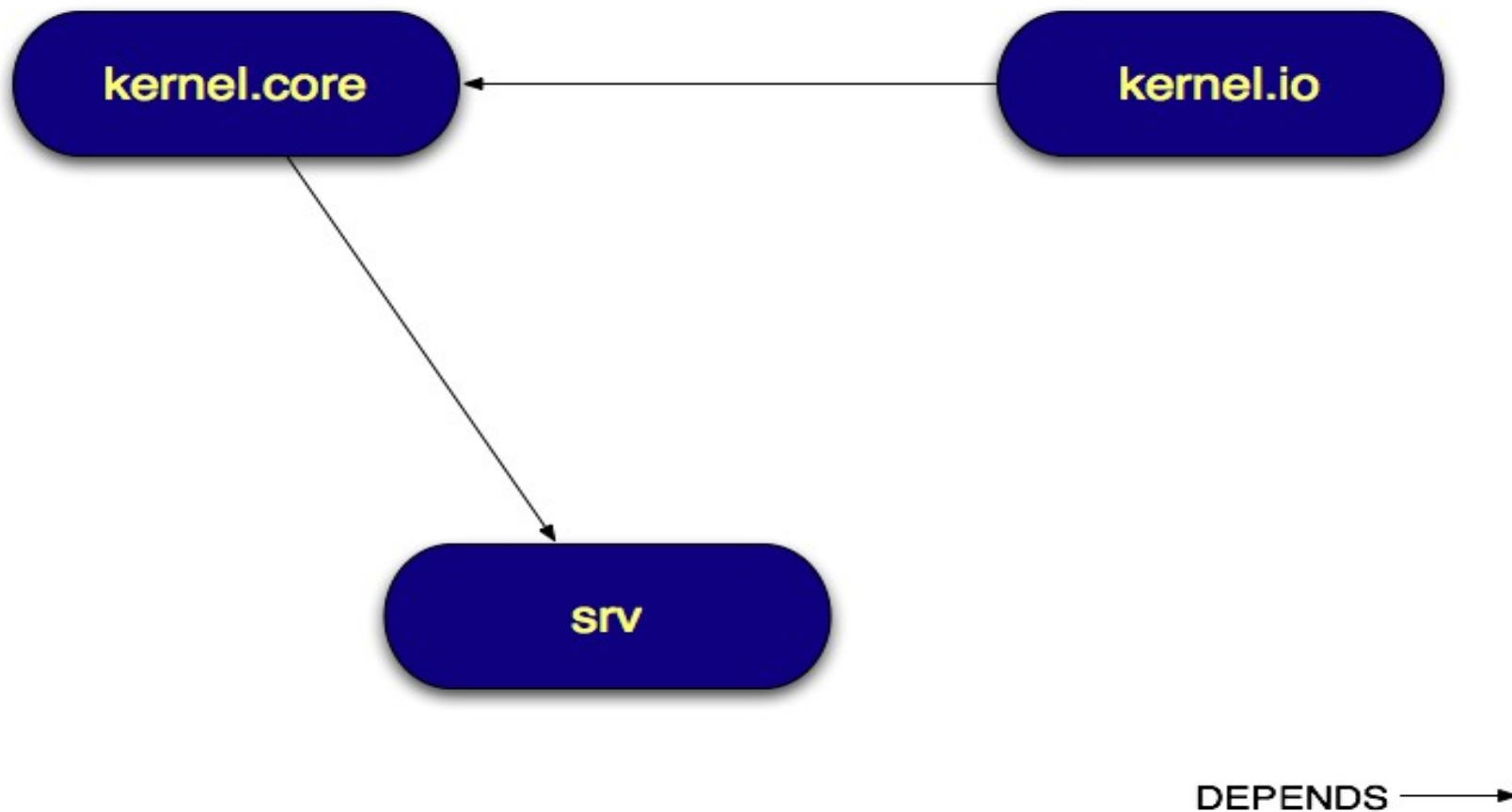
Managing Dependencies

Package Dependencies



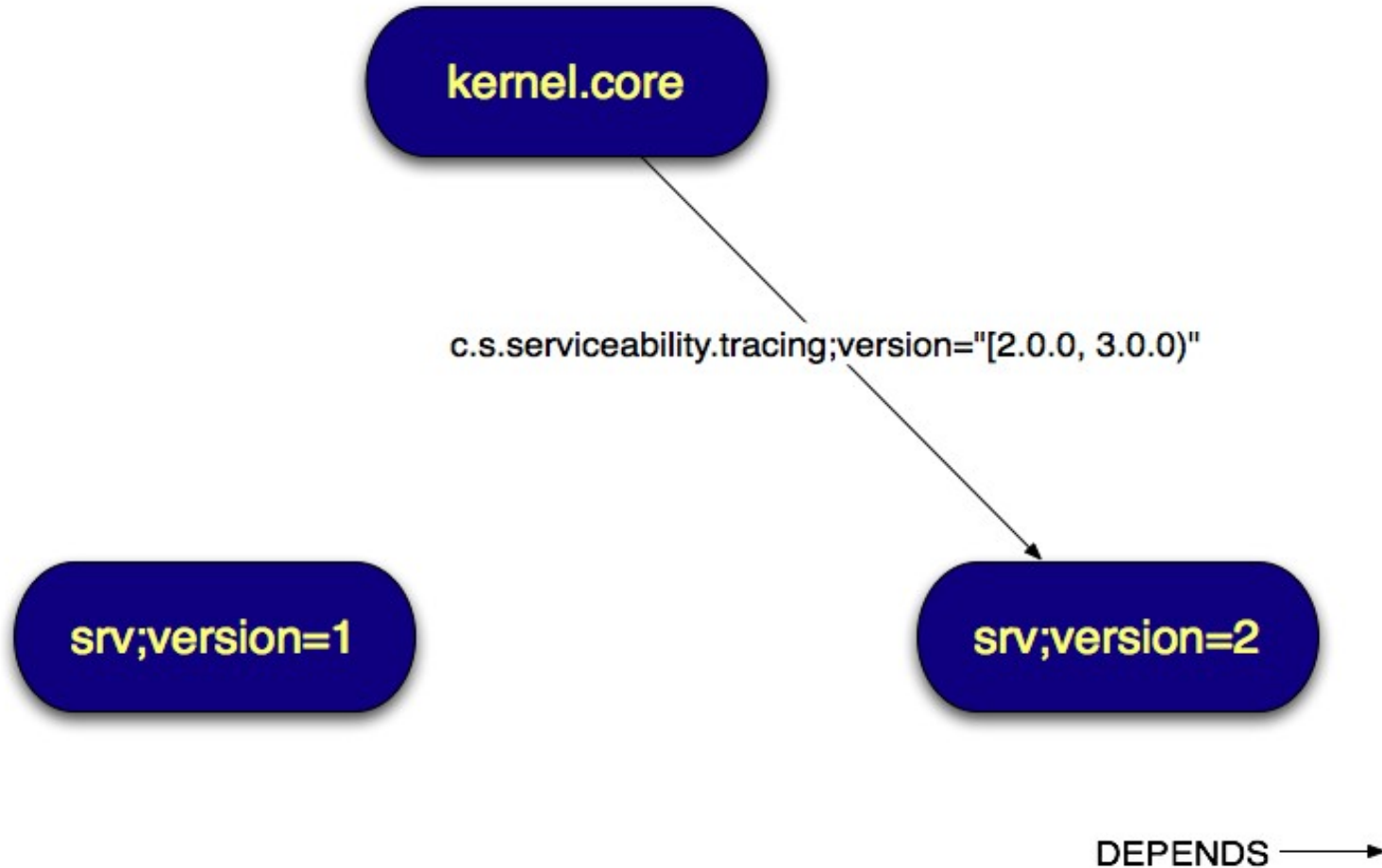


Bundle Dependencies

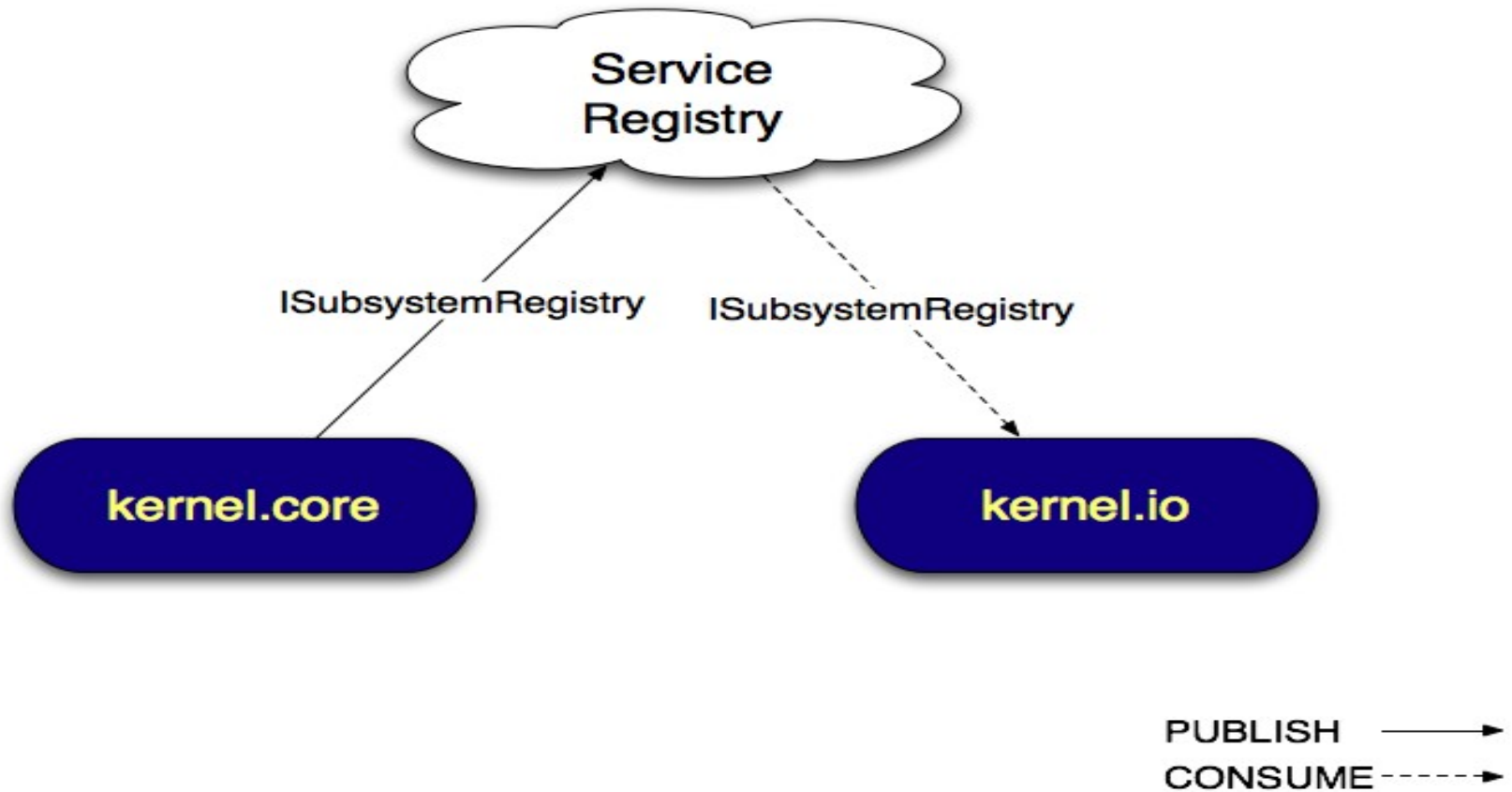




Versioning Dependencies



Service Dependencies





EXAMPLE: GreenPages



Build-time vs. run-time dependencies

● **Artifact-first**

- **Build tooling defines classpath**
- **Manifest is generated**

● **Manifest-first**

- **Manifest is hand-written**
- **Classpath is derived from Manifest**



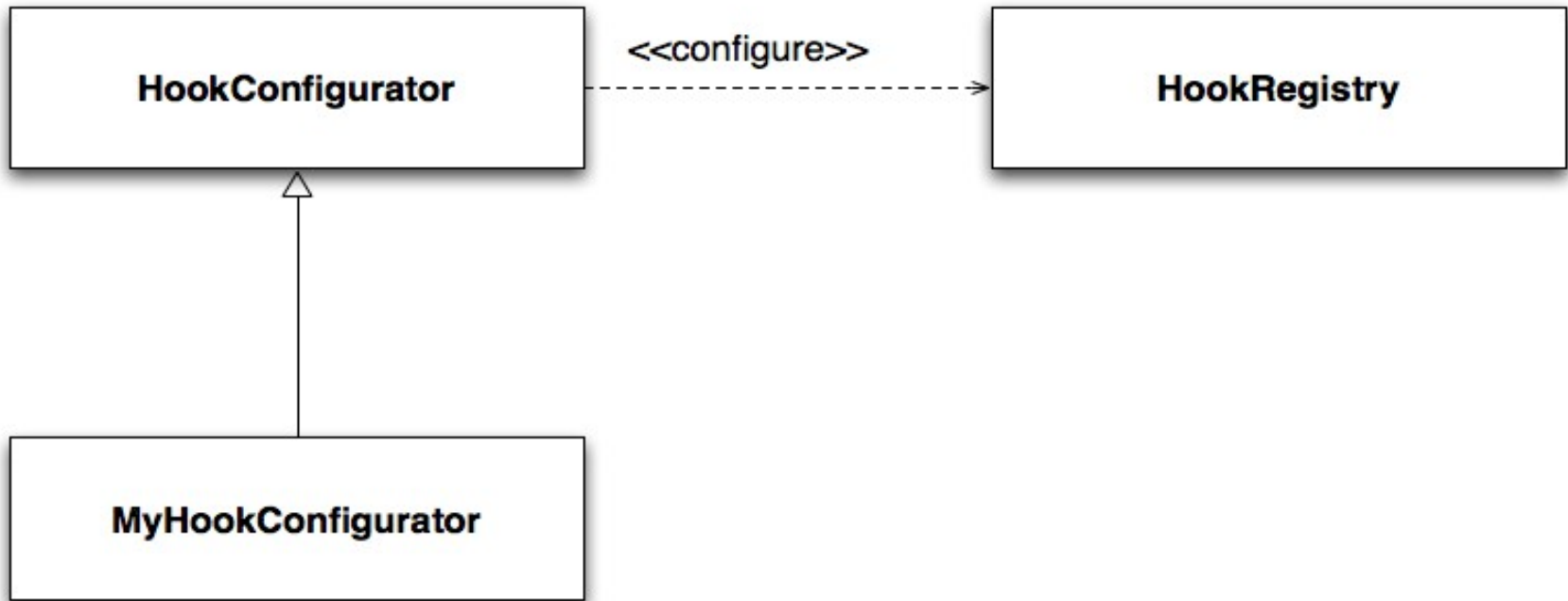
DEMO: Tooling



Extending Equinox



Extension Hook Architecture





Hook Options

- **AdaptorHook**
- **BundleWatcher**
- **ClassloadingHook**
- **ClassloadingStatsHook**
- **ClassloadingDelegateHook**
- **StorageHook**
- **BundleFileFactoryHook**
- **BundleFileWrapperFactoryHookk**



Hooks in dm Server

- **ClassloadingHook:**
 - Replace ClassLoader
- **BundleFileWrapperFactoryHook**
 - Manifest transformation
 - URL fixup



DEMO: Hooks



Handling Concurrency



OSGi Concurrency Basics

- **Bundle state changes are thread-safe**
- **Service register/unregister/lookup are thread-safe**
- **No ordering guarantees**
- **No managed thread-safety for user code**



Interacting with OSGi state changes

- **Listener infrastructure**
 - FrameworkListener
 - BundleListener
 - ServiceListener
- **BundleActivator callback**



Concurrent Application Design

- **Define consistency model**
 - Prefer weak consistency
- **Use OSGi events to drive your system**
 - Guarantees interaction with all state changes (refresh etc)



DEMO: Concurrency



Q&A