Microkernel Architecture

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So far...

Simplicity – Monolith, Pipeline Modularlity – Layered, Pipeline

Definition 1. Extensibility

Features or extensions can be easily added to the software over its lifespan.

How easy is it to extend *Monolith*, *Layered* or *Pipeline*?

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Answer

Monolith – Everything in one container



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How easy is it to extend *Monolith*, *Layered* or *Pipeline*?

Answer

Monolith – Everything in one container Layered – Typically all layers Pipeline – Create a new filter







Definition 2. Interoperability

Software can easily share information and exchange data with internal components and other systems.

What about interoperability?

What about interoperability?

Answer

Monolith – Everything in one container



What about interoperability?

Answer

Monolith – Everything in one container

Internal Fxternal

Layered – Nearest Neighbour



What about interoperability?

Answer

Monolith – Everything in one container

Internal Fxternal

Layered – Nearest Neighbour

Pipeline – Standard Interface



interoperability?

What if I want simplicity, extensibility and

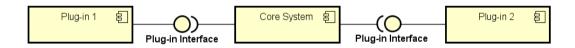
What if I want simplicity, extensibility and interoperability?

Answer

Consider Microkernel Architecture

Definition 3. Microkernel Architecture

Core system providing interfaces that allow plug-ins to extend its functionality.



Definition 4. Registry

Tracks which plug-ins are available to the core system and how to access them.

Loading Plug-ins

Static Loading when application starts

Dynamic Loading as needed at run-time

Registry designed for the selected strategy

Can you think of a *microkernel archiecture*?

Can you think of a microkernel archiecture?

Answer

Web Browser?

Definition 5. Independent Plug-in Principle

Plug-ins should be independent, with no dependencies on other plug-ins.

The only dependency on the core system is through the plug-in interface.

Definition 6. Standard Interface Principle

There should be a single interface that defines how the core system uses plug-ins.

Does a plug-in architecture equate to a microkernel archiecture?

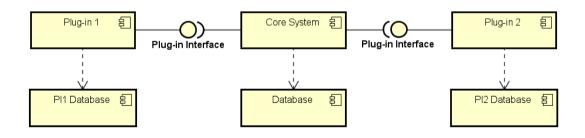
Does a plug-in architecture equate to a microkernel archiecture?

Answer

What about *Intellij*?

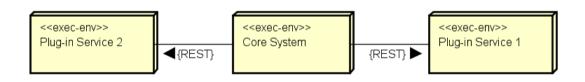
Plug-ins with Separate Databases

- Plug-ins cannot access core system data
 - Core system may pass data to the plug-in
- Plug-ins may have their own persistent data

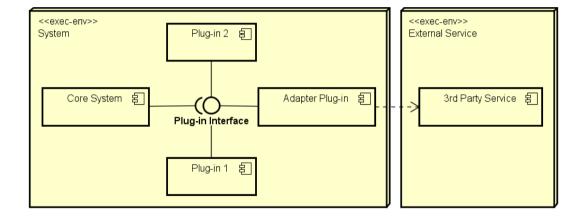


Plug-ins as External Services

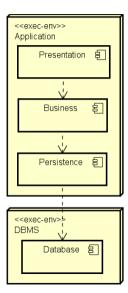
- Need communication protocol
- Registry records communication contract
 - e.g. URL of the REST endpoint & data passed to it



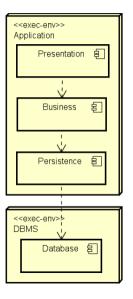
Adapting Non-Conforming Interfaces



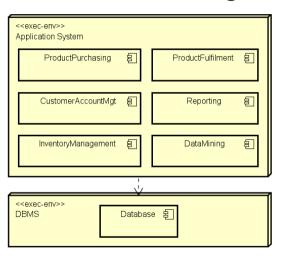
Technical Partitioning



Technical Partitioning



Domain Partitioning



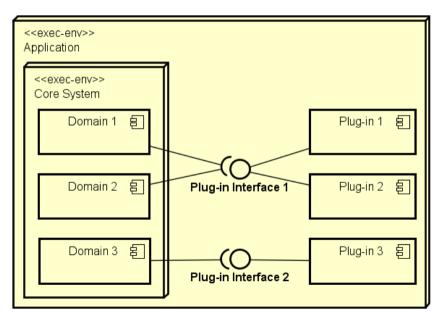
Is the microkernel architecture suited to *technical* or *domain* partitioning?

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Answer

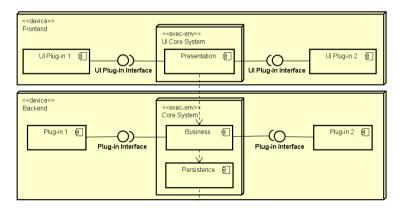
Core system can be partitioned either way.

Domain Standard Interfaces



Distributed Microkernel

- Partitions in the core system can be distributed
 - Technical or domain partitions
 - Plug-ins could also be distributed



Pros & Cons

Simplicity Core system & Plug-in interface

Extensibility Plug-ins

Interoperability Plug-ins



Scalability



Reliability