API: the Glue of Microservices

Introduction to the Cell-based Architecture

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Motivation
Greenfield < Brownfield
Reference Implementations

picture credit: https://www.marinersmuseum.org/
Underutilization of the Technology
Not enough support for Agility
Architecture Patterns
Timeline

1970: Mono
1980: 2-Tier
1990: 3-Tier
2000: MVC
2012: WOA, EDA, MSA

Layered to segmented transition.
Background: Layered Architecture
Rise of Microservices
Pragmatic Microservices

- Netflix: APIs
- Uber: Edge Gateway
- eBay: API Facade
- Gartner: Mini Services
Background: Layered Architecture with MSA
Background: Segmented Architecture

Business Communities
- Quality Assurance
- Marketing
- Finance
- HR
- Help desk
- Information management
- Sales

Management Layer
- Gateway
- API Life-cycle
- Monitoring
- Catalog

Presentation Services

Governance
- Behaviours
- Controls
- Certification
- Policies
- Enforcement

Utility Services

Storage
- RDBMS
- NoSQL
- Files
- in-memory
Building the Concept
A **code** exposes through an **interface** that describes a collection of operations that are **network accessible** using a standardized messaging protocol.

```java
public class PersonApi {
    @Path("/greet")
    @GET
    @Consumes(MediaType.APPLICATION_JSON)
    @Produces(MediaType.APPLICATION_JSON)
    public JSONObject sayHello() {
        try {
            return new JSONObject().put("greeting", "Hello world");
        } catch (JSONException e) {
            return null;
        }
    }
}
```
Microservice: Technical definition

A microservice must have a **single purpose** and be loosely coupled in design and deployed independently of other microservices. "Micro" is a concept of **scope** rather than **size**.
Service: Business definition

Software components that can be spontaneously discovered, **combined**, and **recombined** to provide a solution to a **business problem**.
Microservice: Business definition

Microservices is an approach to application development in which a large application is built as a suite of **modular components** or services. These services are built around **business capabilities**.
Group of Microservices
The cell is the basic structural, functional, and biological unit of all known living organisms.
Cell-based Reference Architecture
Component: Atomic Units

A **component** represents a process or business logic running in a container, serverless environment, or an existing runtime. A component is designed based on a specific scope, which can be independently run and reused at the runtime.
Cell: Units of Enterprise Architecture

A cell is a collection of components, grouped from design and implementation into deployment. A cell is independently deployable, manageable, and observable.
Cell:Component
1:M
1:1
Inter and Intra Cell communication
Connected Cells

Cell gateway (ingress/egress)

Sidecar

Adaptor

Ambassador
Gateway Pattern

picture credit: https://www.flickr.com/photos/ell-r-brown/
Automated governance is made of three things:

- **A source of truth:**
  - Policy store/registry

- **Enforcement of the policy**
  - Gateway or plugin attempting to keep the desired state

- **Observability**
  - How close to the desired state are we?
Security of Cells
Security of Cells
Lifecycle of a Cell
Structured Agility

Versioned Components
Versioned Cells
Dependency managed
Autowired
Reusable
MSA & CNA compliant
Cell-based Enterprise Architecture
Reference Implementation L0
Reference Implementation L1
Cells and Podular Organizations

- Decentralized
- Self-organized plan, build, test, run, manage
- Podular
- Continuous
- Cloud-native
- Cell-based
- Pipeline tuned
- Blue green canary
- Rapid releases
- Distance @ the edge of the consumer
- MVP
- Time
Connected Cells

picture credit: https://www.medicalnewstoday.com/
API-centric Architecture
Summary: Cell-based Reference Architecture

- Self-contained
- Deployable as a unit
- Independently elastic
- Data plane and control plane
Just a (steady) start

https://wso2.com/architecture/
THANK YOU

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