

Cloud Software Engineering - IF3520 Proyek Perangkat Lunak

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A. Cloud-Native Fundamentals

Cloud-Native adalah pendekatan membangun aplikasi yang memanfaatkan cloud computing. Cloud-Native didukung 4 pilar sebagai berikut:

- **Container:** Unit perangkat lunak portabel yang mengemas aplikasi dan dependensinya
- **Microservices:** Layanan kecil independen fokus pada satu kemampuan bisnis
- **DevOps:** Penyatuan tim development & operations melalui otomatisasi dan kolaborasi
- **Orchestration:** Koordinasi otomatis containerized workloads dan services dalam skala besar

Perbandingan: Traditional (Monolithic, Manual Deployment, Vertical Scaling) vs Cloud-Native (Microservices, Automated CI/CD, Horizontal Scaling, Dynamic Orchestration).

B. Core Technologies

1. Containerization & Docker: Konsistensi antar-environments
2. Kubernetes: Orchestration containers (Pod, Service, Node, Deployment, ConfigMap/Secret, Ingress)
3. CI/CD Pipeline: Otomatisasi dari change ke deployment
4. API Gateway: Entry points untuk external client (routing, authentication, rate limiting)
5. Infrastructure as Code: Mengelola infrastruktur menggunakan kode
6. Cloud Native Landscape

C. Development Patterns

1. 12 Factor App: Codebase; Dependencies; Config; Backing services; Build, release, run; Processes; Port binding; Concurrency; Disposability; Dev/prod parity; Logs; Admin processes
2. Event Driven Architecture: Komunikasi loose coupling melalui event channel
3. Sidecar Pattern
4. Circuit Breaker Pattern: Melindungi sistem dengan menghentikan panggilan ke layanan gagal
5. Database per Service: Setiap microservice memiliki database sendiri

D. Multi-Cloud Strategies

Alasannya adalah economic reason, avoid vendor lock-in, best of breed, risk mitigation, regulatory compliance, mergers & acquisitions. Layernya terdiri dari application, orchestration, infrastructure. Kekurangannya adalah complexity (multiple dashboards/APIs), cost (data transfer, duplicate services), capability issues. Best practice cloud-native adalah containerization, managed orchestration, standardize tooling, cost monitoring, data management planning, security.

E. Career and Futures

Skill yang diperlukan untuk berkarir di bidang cloud-native ini adalah scripting (Bash, Python), docker & kubernetes, cloud platform (AWS, Azure, GCP), CI/CD pipeline (GitHub Actions, Jenkins), infrastructure as code (Terraform, Pulumi).