CRITICAL EVALUATION AND COMPARISON BETWEEN PROPRIETARY AND OPEN-SOURCE CLOUD SYSTEMS

VIKTORIA PLUY

SUMMER SEMESTER 2023

OVERVIEW

- Cloud Systems
- Comparison between Proprietary and Open-Source Cloud Systems
    - Interoperability
    - Cost
    - Security
    - Innovation
    - Usability
    - Support
    - Ethical Aspects
    - Cloud Providers in 2023
- Critical Evaluation
- Development Trends

CLOUD SYSTEMS

"Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction." – United States Government

- **On-demand Self Service:** Provisioning without interaction

- **Broad Network Access:** Provisioning through the Web

- **Resource Pooling:** Provisioning to multiple clients → Multitenancy

- **Rapid Elasticity:** Quick providing of services

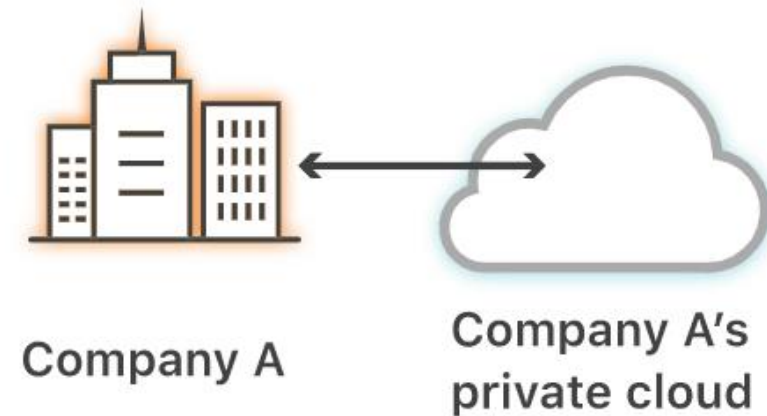- **Measured Services:** Monitoring of service utilization

CLOUD SYSTEMS II

Private Cloud
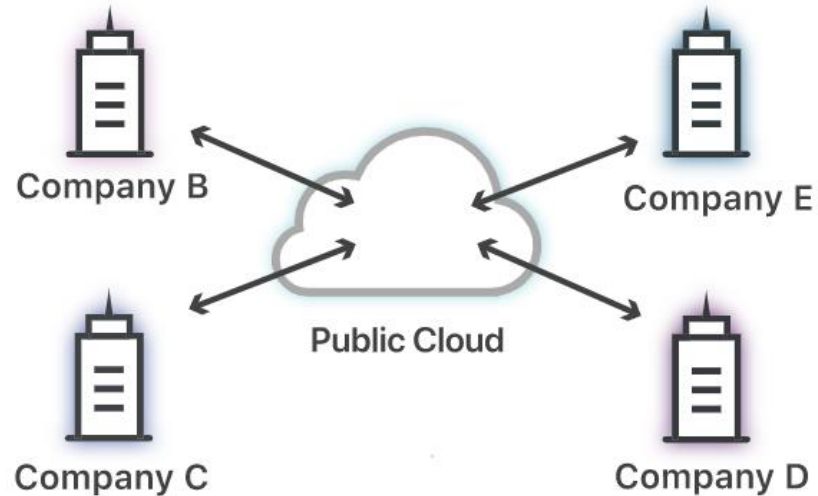
- Obtainable via the internet

- Managing and owning the data

Public Cloud

- "Internal Cloud"

- Resources accessible to one user

CLOUD SYSTEMS III

- **Infrastructure as a Service (Iaas)**

  - Provision of computing resources

  - Utilization of needed resources

  - Contract or pay-as-you-go

- **Platform as a Service (Paas)**

  - Offering of deployment platform for application

- **Software as a Service (Saas)**

  - Access to software applications

  - Payment based on consumption

CLOUD SYSTEMS IV

- **CLOUD Act (Clarifying Lawful Overseas Use of Data Act)**

  - Adopted in March 2018

  - Rules for sharing user's data → criminal proceedings

  - Background: Difficulties to acquire warrants/subpoenas

  - Foundation of CLOUD Act: Case of Microsoft Ireland

  - Bilateral agreements: UK and US → Data Access Agreement

  - Conflict with European GDPR

  - No mutual agreement between US and EU

PROPRIETARY & OPEN-SOURCE CLOUD

- **Proprietary Cloud**

  - Computing infrastructure maintained by one vendor

  - No modification of source-code

  - Subscription/licensing fees

- **Open-Source Cloud**

  - Publicly available source-code

  - Collaborative process

  - 1960/1970: Agreement to share source-codes → Unix

  - 1980: GNU Project (Richard Stallman) → Distribution & modifying

  - 1990: GNU/Linux

  - 2000: Investment into open-source projects

COMPARISON – **INTEROPERABILITY**

Proprietary Cloud System

- Uniquely used proprietary protocols

- Vendor Lock-in

- Re-adjusting when switching vendor

- Tools and API's for integration from vendor/third-party organizations

Open-Source Cloud System

- Accessibility of source-code → Easier implementation

- Tackle interoperability as developer community

COMPARISON – **COST**

Proprietary Cloud System

- Licencing fees → Maintenance, Support

- Deployment → Hardware, implementation, acquisition

- Customization → Configuration and changes

Open–Source Cloud System

- No licencing fees

- Deployment → Hardware, charge for add-ons

- Customization free → Community support

COMPARISON – **SECURITY**

Proprietary Cloud System

- "More secure" → Developing in controlled environment

- Quicker response to security breaches

- Need for high trust between vendor and customer

- Intense auditing by professionals

Open-Source Cloud System

- Development by individuals globally → Shared responsibility

- Transparency as advantage for auditing → Collaborative process

- Fast response time → Twice as quickly compared to proprietary

- Integration of patches by the user → Expertise needed

COMPARISON – **INNOVATION**

Proprietary Cloud System

- Investment into R&D

- Budget increase and expertise →
  Innovation

- Online client groups → Reviews

- Need to not become irrelevant →
  Profit-seeking

Open-Source Cloud System

- Innovation through modification of
  source-code

- Collaborative process → Innovation

- "Hidden innovation"

COMPARISON – **USABILITY**

Proprietary Cloud System

- Usability as competitive advantage
  → Abandonment

- Regular usability testing

- Distribution of support manuals/material

Open-Source Cloud System

- Acknowledgment of usability

- Testing by user community → No developer bias

- Documentation over online-forum

- Ability to integrate other framework/tools

COMPARISON – **SUPPORT**

Proprietary Cloud System

- Greatest competitive advantage

- Support via live chat/hotline/personal contact

- Immediate help

Open-Source Cloud System

- Support through online community

- Collaborative process

COMPARISON – **ETHICAL ASPECTS**

- **Ethical considerations**
  - **Data**
    - Data Privacy
    - Data Ownership
    - Data Security
  - **Provider**
    - Sustainable and green cloud computing
  - **User**
    - Individual Empowerment → Co-Creation/Co-Develop

COMPARISON – **ETHICAL ASPECTS**
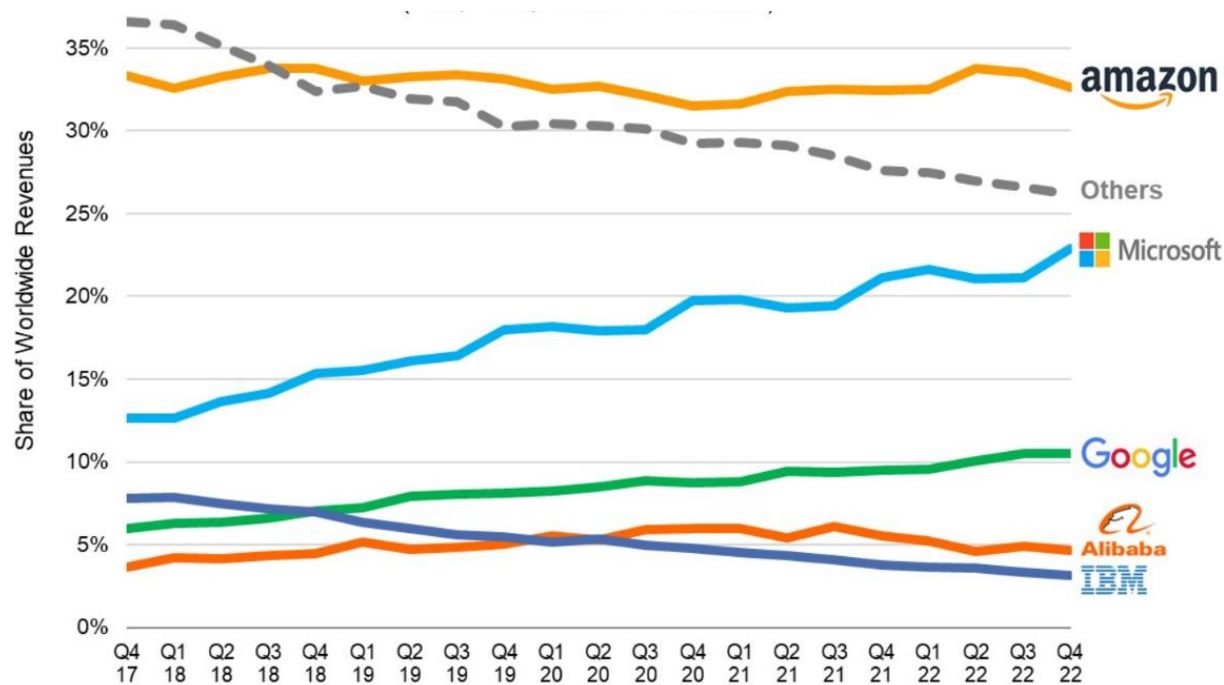
Proprietary Cloud System

- No ownership by the vendor →
  Granting ownership by the user

- Safety? → CLOUD Act

- Need for significant energy
  resources → Strategies for CO_2-
  reduction

- Possibility for customization but no
  development

Open-Source Cloud System

- Users maintain ownership

- Need for significant energy
  resources → Strategies for CO_2-
  reduction

- Easy to co-develop/co-create →
  Transparency of source-code

COMPARISON – **CLOUD PROVIDERS 2023**

Proprietary Cloud System

Open–Source Cloud System

- **OpenStack**
  - Developed by NASA
  - Computing, storage
- **Kubernetes**
  - Developed by Google
  - Containerization capabilities
- **CloudStack**
  - Offering of Iaas
  - Supports AWS API's

CRITICAL EVALUATION I

Proprietary Cloud System

- Biggest asset → Service and Support

- Non transparency of source-code → Dependency on vendor

- Vendor lock-in

- Licencing fees

Open-Source Cloud System

- Transparency of source-code

- High interoperability

- Online community

- No promise for support

- Strong expertise needed

CRITICAL EVALUATION II

- **Utilization of open-source cloud system more advantageous**

  - Higher flexibility → Customization, security, innovation, interoperability

  - Lower costs

  - Online community

  - Existing open-source alternatives

  - No vendor lock-in

DEVELOPMENT TRENDS

- **Artificial Intelligence**
  - Inclusion of AI into services
  - Example → Chat GPT

- **Serverless Computing**
  - "Serverless"
  - Added layer of abstraction between platform and user
  - Reduction of costs

- **Multi- and Hybrid Clou**d
  - Seeking to find the right balance
  - OpenStack: Environment with vendor neutrality

- **Green and Sustainable Cloud Computing**

- **Increased Regulation**

CRITICAL EVALUATION AND COMPARISON BETWEEN PROPRIETARY AND OPEN-SOURCE CLOUD SYSTEMS

VIKTORIA PLUY

SUMMER SEMESTER 2023