Multi-cloud Paradigm : An Integration Approach

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Evolution of Cloud Technology

1970s — Mainframes
Localized Infrastructure | Expensive

1980s — Arrival of PCs
Rise in popularity of desktops | Decentralized Computing

1990s — Client Server Architecture
Emphasis on Networking | Increased demand of bandwidth | Dotcom revolution

2000s — Hosted Environments & Arrival of Cloud
IT Infrastructure Management Services by 3rd party providers | Creation of large datacenters | Increased use of virtualization | Launch of Amazon WebServices | VmWare's cloud initiative

2010s — Introduction to Hybrid and Multi-clouds
IBM launches public cloud service | Microsoft launch Azure | Launch of Openstack | Google introduces Google Computing Engine | Integrated Hybrid and multi clouds
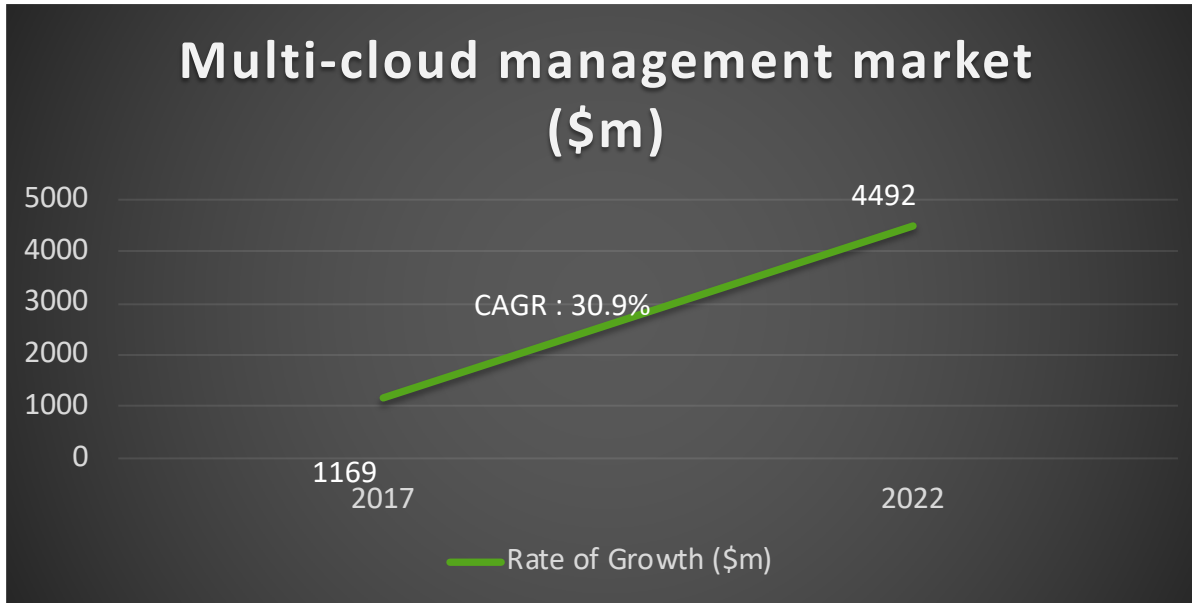
Future — Open & Automated Clouds
Interoperable | Built on Open, Industry standards | User experience adapt to patterns and behaviors | Predictive, real-time analytics
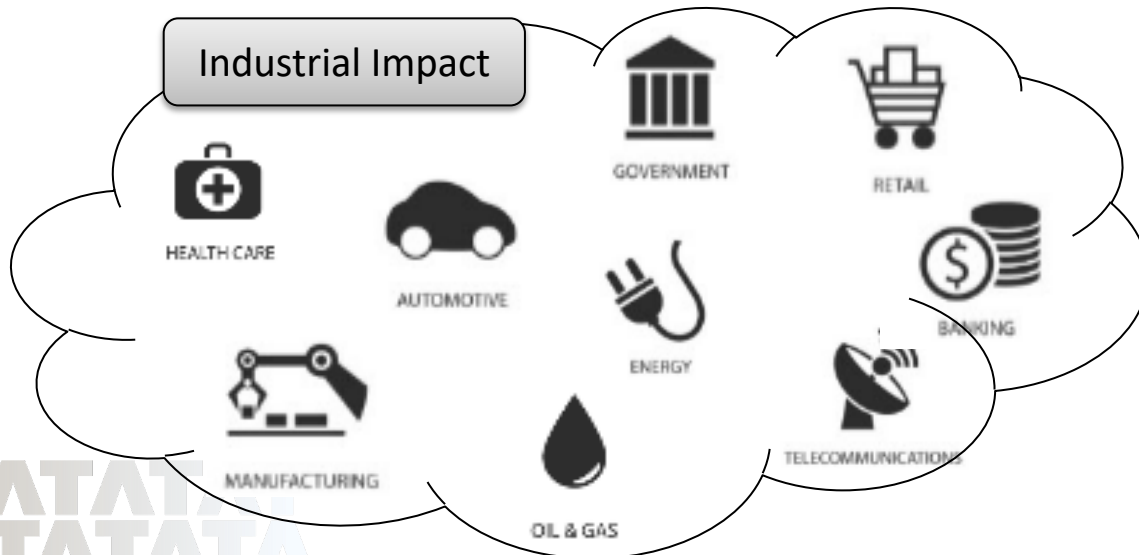
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Drivers For Multi-cloud Strategy | Analyst View

Multi-cloud management market ($m)

CAGR : 30.9%

4492

1169
2017

2022

— Rate of Growth ($m)

Industrial Impact

HEALTH CARE
AUTOMOTIVE
GOVERNMENT
RETAIL
ENERGY
BANKING
MANUFACTURING
OIL & GAS
TELECOMMUNICATIONS

Avoidance of Vendor Lock-in

Increased Agility

High-level of Governance & Policies

Source: www.researchandmarkets.com

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Single Cloud Strategy | Drawbacks

- Discounted Pricing by cloud providers

Lock-In | Commercial

Redundancy

- No flexibility to recover in case of failure or regional restrictions
- Data Protection & Archival

Lock-In | Team Skill

- Cost of boosting team-skills to be cloud-ready

Lock-In | Compliance

- Lengthy cloud On-boarding Process due to time required in getting regulatory & compliance approvals

Availability

- Outages due to unforeseen weather conditions or human errors.

Evolving Technologies

- Requirement of more open APIs (ML, DB, DRaaS, Evolving technologies, such as IoT and machine learning (ML)

Regulations

- Geography specific Regulations (e.g. GDPR, PIPEDA)

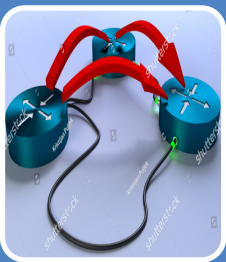**TATA** CONSULTANCY SERVICES

Multi-cloud Strategy Implementation | Challenges

Management Complexity

- Handling multiple consoles from Cloud Service Providers
- No Central visibility in Infrastructure

Cost Tracking

- Cloud diversity brings risk and loss of control over budgeting
- Cloud platforms have their unique pricing models & billing systems
- Need to proactively predict the expenditure pattern.

Compliance

- Considering policies of Company and Industry
- Considering regulations of country

Security Concerns

- Data-at-rest is secured, but data-in-transit need to be secured and encrypted.
- Policies for 3As (Authentication, Authorization and Accounting), monitoring and alerts to be implemented

Redundancy

- Strategy for data redundancy, backups and DRs cannot be overrated.
- Requirement of auto-switching in case of failed operability

Cloud Expertise Gap

- More the no. of cloud environments, more difficult to extend skills.
- Designing, implementing and managing these complex environments requires high levels of cloud and IT proficiency

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Modern Data Management Solutions | A Perspective on Benefits and Gaps

Single Pane Management
- Automation & Orchestration : Application migration, VM instances, Configuration management
- Security & Compliance: Identity Access & Management (IAM), Encryption, Audit
- Performance Monitoring: Storage, Compute, Application, Network

Data Portability & Insight
- Ability to migrate data to another cloud
- Ability to migrate within zones and regions of choice
- Temptation to use latest AI, ML and data analytics services on secondary data

Data Protection across Clouds
- Use of one Data Protection platform across clouds eases data silo challenge

Improved Compliance Management
- Functionality to consistently meet the data retention and compliance obligations of regulated organizations
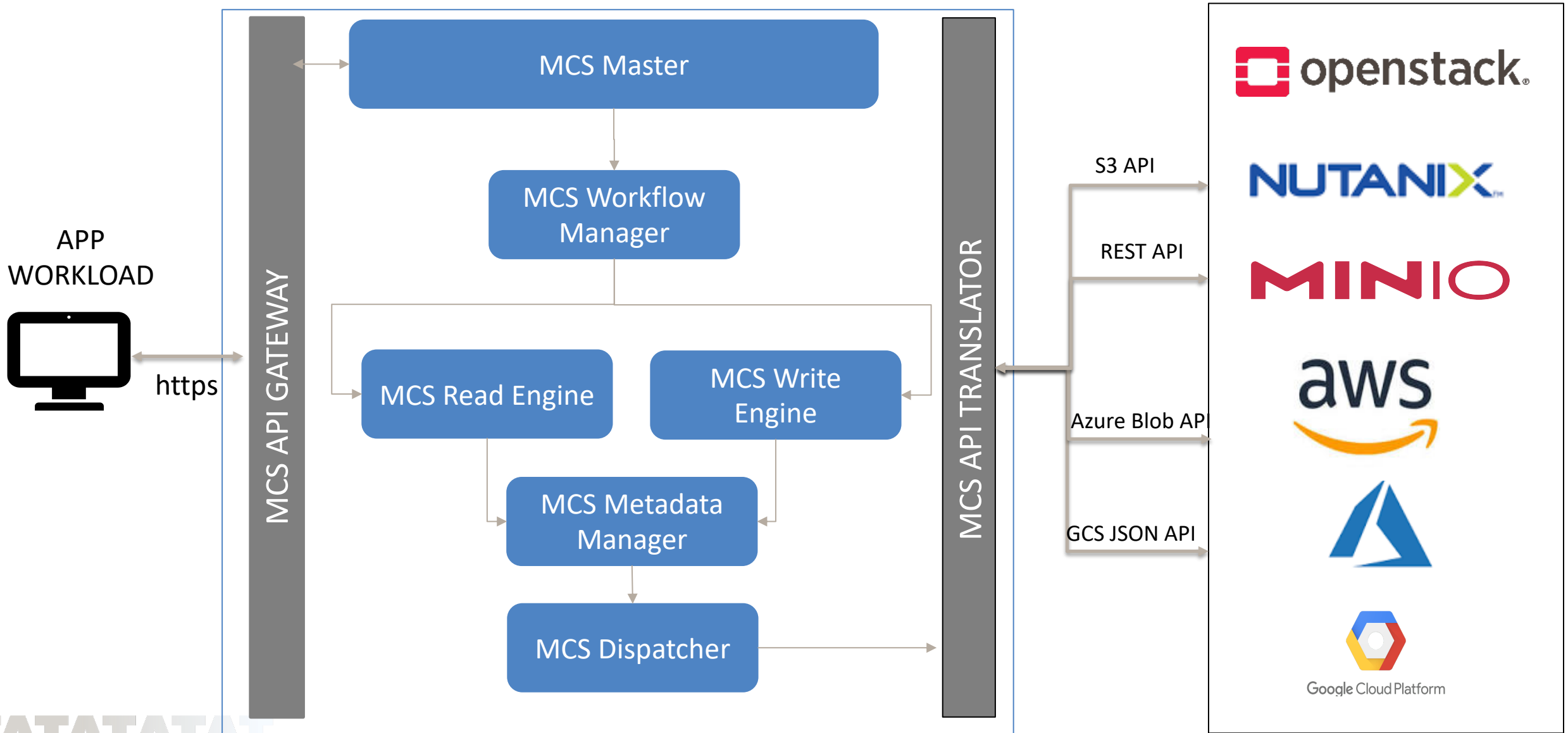
Abstraction
- Deploying services on top of native cloud services
- Single way to look at multi-cloud resources such as Storage, Compute
- Benefit includes reduced human intervention and hence mistakes.

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APP WORKLOAD

https

MCS API GATEWAY

MCS Master

MCS Workflow Manager

MCS Read Engine

MCS Write Engine

MCS Metadata Manager

MCS Dispatcher

MCS API TRANSLATOR

S3 API

REST API

Azure Blob API

GCS JSON API

openstack

NUTANIX

MINIO

aws

Google Cloud Platform

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Distributed Management Task Force (DMTF)

- Cloud Infrastructure Management Interface (CIMI) for Infrastructure as a service (IaaS) Management
- Proposed CIMI model for Cloud Interoperability

Open Grid Forum (OGF)

- OCCI (Open Cloud Computing Interface)
- OCCI is a Protocol and API for all kinds of Management tasks.
- API with a strong focus on **integration**, **portability**, **interoperability** and **innovation**
- Implementation on Apache CloudStack and OpenStack

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