Apple Bank

Cloud Computing Service Models Whitepaper

Definition, Hosting/Operating Models, IT Strategy and Vision

October 2021

Anthony Scarola

FVP – IT GRC-CM Officer

Technology Department

Outline

- Cloud Computing Definitions
- Data Center Environments, General Cloud Service Models
- Advantages & Disadvantages
- Cloud Deployment Models
- Bank Application Services & Current Hosting Environments
- Case Studies
- Disaster Recovery Strategy
- Cloud Service Models to Apple Bank IT Operating Model
- Vendor Management Oversight Targets
- Application Hosting – Future

Apple
Bank

Cloud Computing Definitions

Definitions from the National Institute of Standards and Technology (NIST) and WSJ

"Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." – NIST[1]

"At its core, cloud is the concept of using a network of remote servers hosted on the internet to store, manage, and process data as well as provide application services, rather than doing so on local, or on-premise, servers. – WSJ[2]

Cloud has different "service models" to include infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS), and software-as-a-service (SaaS), and also different "deployment models" such as private, public and hybrid.

1. National Institute of Standards and Technology (NIST) Special Publication 800-145; September 2011 – see https://csrc.nist.gov/publications/detail/sp/800-145/final
2. The Wall Street Journal; November 2018 – see https://deloitte.wsj.com/articles/why-cloud-is-on-the-boards-agenda-1542160939

Apple Bank

Data Center Environments, General Cloud Service Models

Comparison of Data Center Environments, Internal and Externally-hosted, and Responsibilities

Cloud Service Models & General Management Responsibilities

Data Center On-site	Infrastructure-as-a-Service (IaaS)	Platform-as-a-Service (PaaS)	Software-as-a-Service (SaaS and ASP*)
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
Operating System	Operating System	Operating System	Operating System
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

■ **Customer Manages**

■ **Service Provider Manages**

*ASP can leverage their own private cloud or can use public cloud

Apple Bank

Image from RedHat – see https://www.redhat.com/en/topics/cloud-computing/iaas-vs-paas-vs-saas

Advantages & Disadvantages

What is the Value of Cloud Computing? What are the issues?

Advantages - Rewards
- Reduced infrastructure costs, future headcount costs
- Releases and patches managed by 3rd party
- Increased redundancy for maximized uptime; enhanced business continuity
- Breaches and related incidents are less common, less probable
- Easier to scale processing power and storage for growth (reduced time for benefits)
- Accessibility and Bank saves on physical space

Disadvantages – Risks - Threats
- Need for fully understanding the costs (i.e., unexpected, back-end costs)
- Limited or loss of control of some services (environment, physical infrastructure)
- Increased vendor lock-in; not easy and potentially expensive to move to other providers
- Training of service provider's solution and control options (e.g., security) is necessary
- Increased vendor due-diligence (SOC, penetration testing, etc.) and contract scrutiny necessary
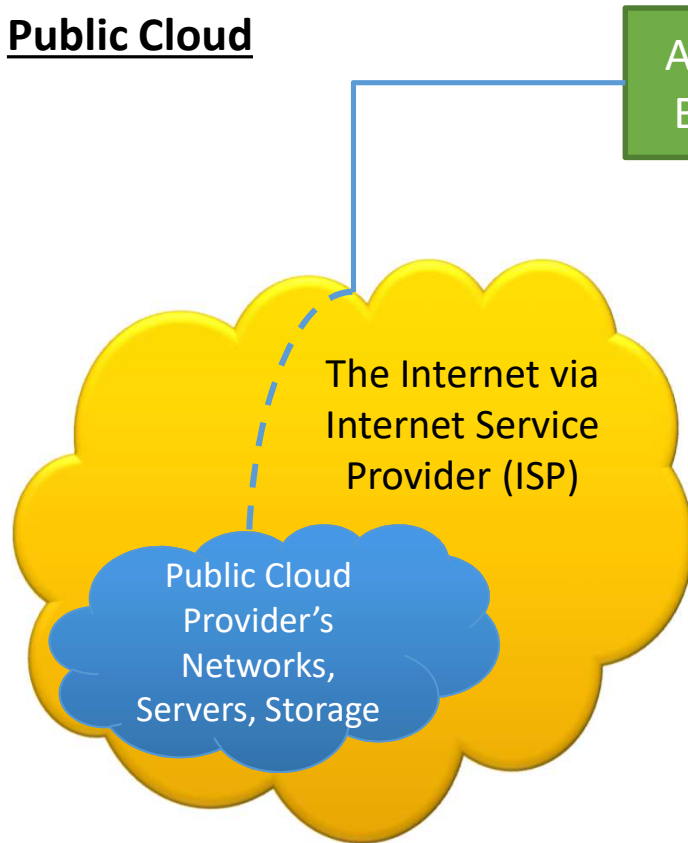- Unknown-unknowns and potential related up-front concerns (e.g., security)

Similarities
- Bank is accountable to protect information and systems; even though responsibilities may shift
- Bank is responsible to understand the technology, the threats, the risk and control options for protecting the information and systems
- Threats: Cyber security, hacking, data loss, denial of service, insider, etc.
- High-level architecture of virtualized data center (i.e., it's just a server sitting in another company's data center with different management responsibilities)

Cloud Deployment Models
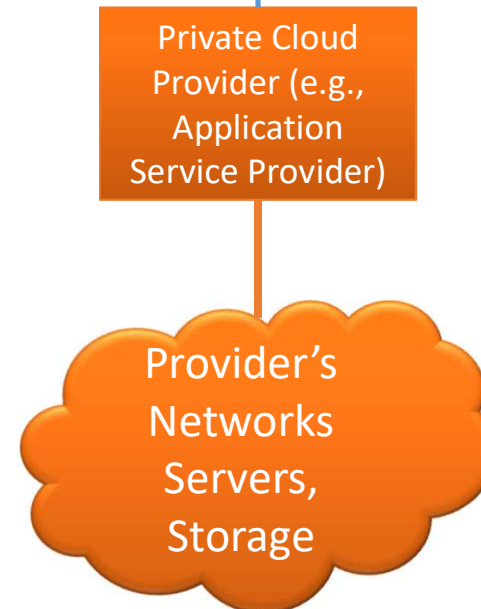
Public vs. Private Cloud

Public Cloud

Apple Bank

Dedicated Circuits

Private Cloud / ASP

The Internet via Internet Service Provider (ISP)

Private Cloud Provider (e.g., Application Service Provider)

Public Cloud Provider's Networks, Servers, Storage

Provider's Networks Servers, Storage

Examples: Amazon Web Services (AWS), Google Cloud Platform (GCP), Microsoft Azure

Examples: FIS IBS, McCracken, FCM, and Q2

Apple Bank
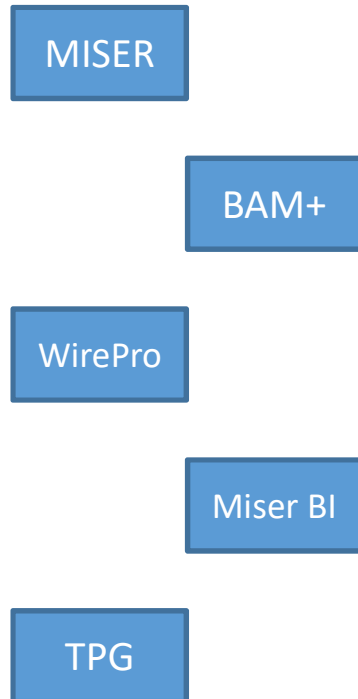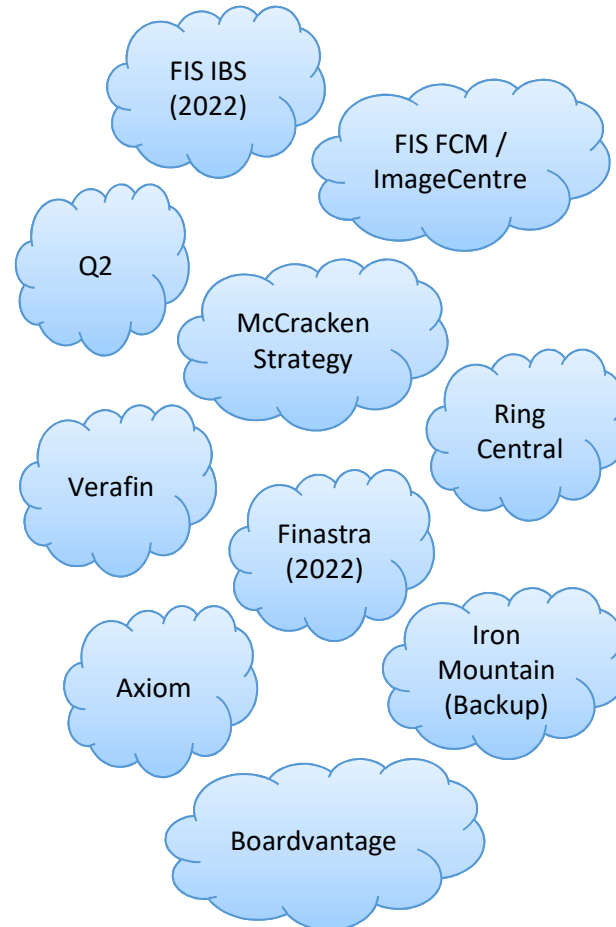
Bank Application Services & Current Hosting Environments

What is the Bank currently operating internally vs. cloud?

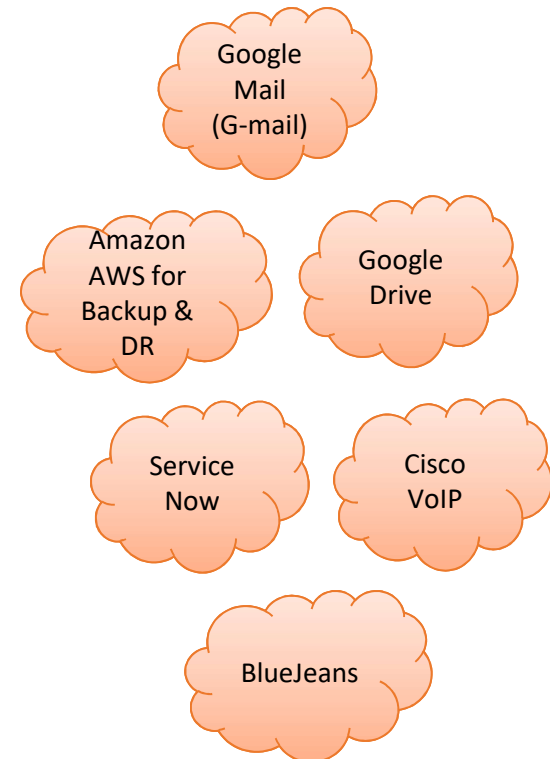**Internal Data Center**

- MISER
- BAM+
- WirePro
- Miser BI
- TPG

Private Cloud / ASP

- FIS IBS (2022)
- FIS FCM / ImageCentre
- Q2
- McCracken Strategy
- Ring Central
- Verafin
- Finastra (2022)
- Axiom
- Iron Mountain (Backup)
- Boardvantage

Public Cloud

- Google Mail (G-mail)
- Amazon AWS for Backup & DR
- Google Drive
- Service Now
- Cisco VoIP
- BlueJeans

Apple Bank

Case Studies

For Cloud

Amazon AWS (Private Cloud) and VMware Cloud Disaster Recovery
For: Disaster Recovery Strategy
Why: Cost-effective and doesn't increase our risk.

ARGUS Cloud
For: REVAD; Commercial property valuation & real estate asset mgmt.
Why: Vendor's operational support model is better in the cloud.

Finastra & Verafin
For: Replace Abrigo (WirePro & BSA Manager / Banker's Toolbox)
Why: Current in-house solution is troublesome and resource-intensive

Against

DocuWare Cloud
For: Document Management
Why Not: Information Security concerns.
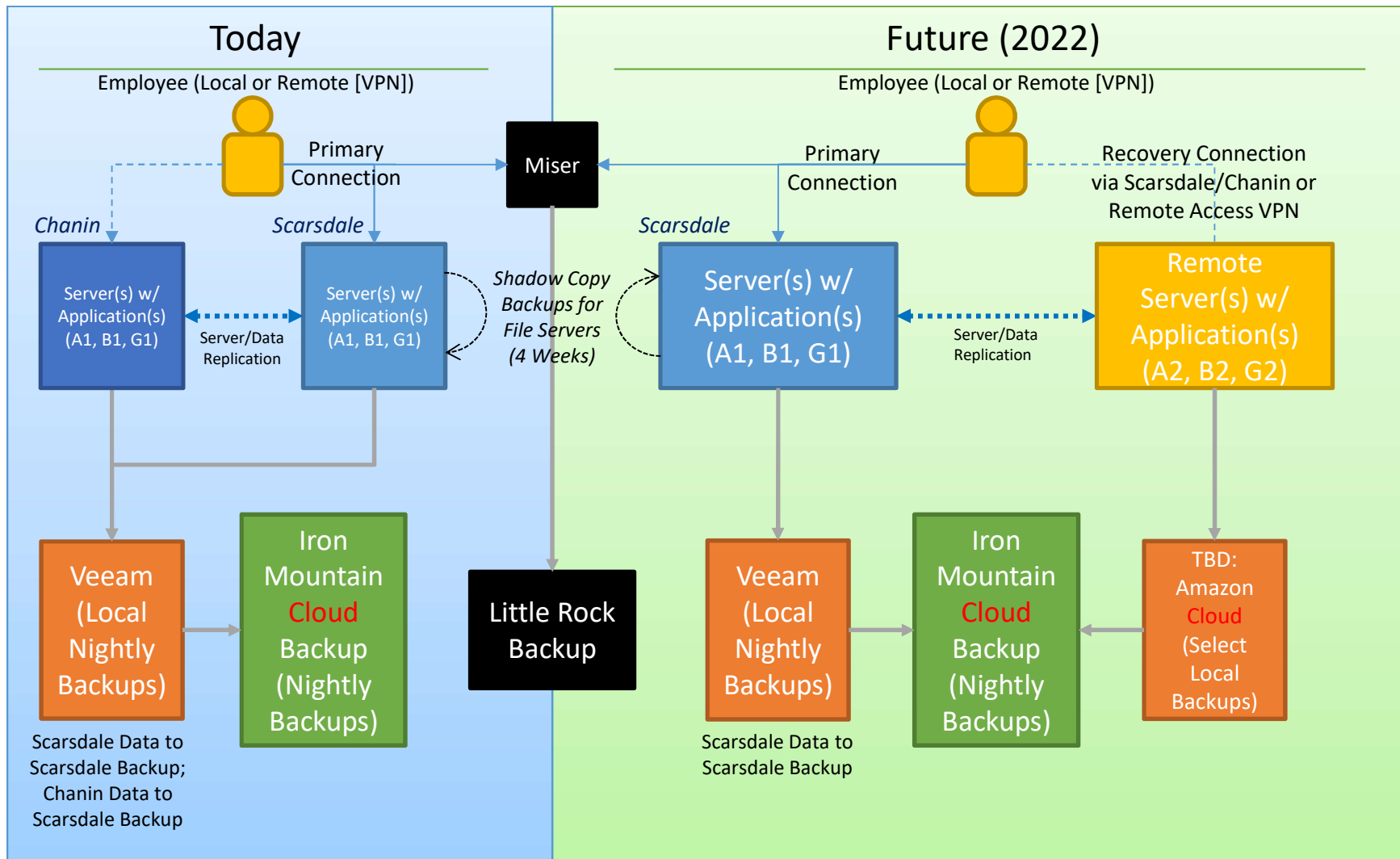
MOVEit Managed File Transfer
For: Secure File Transfer Solution
Why Not: Could not agree on privacy terms.

CONFIDENTIAL

CONFIDENTIAL

Apple Bank

Disaster Recovery Strategy

Today and Tomorrow

Cloud Service Models to Apple Bank IT Operating Model*

	A1	A2 IaaS	B1	B2 IaaS/PaaS	B3 SaaS/ASP	G1	G2 IaaS
Description	Appl. Customized and Supported by Bank		Applications Customized and Supported by the Vendor			Bank-developed Applications	
Hosting Model	Internal Data Center	External (Cloud IaaS)	Internal Data Center	External (IaaS, PaaS)	External (ASP, SaaS)	Internal Data Center	External (Cloud IaaS) *Future*
Data Custodian	Bank						
Environmental Controls, Physical Infrastructure & Uptime, Physical Security	Bank	Hosting Provider	Bank	Hosting Provider		Bank	Hosting Provider
Logical Security, Logical Server Mgmt., OS Patching, Logical Network, Job Scheduling /Batch Processing	Bank			Bank or Provider (Depends on Application)	Hosting Provider	Bank	
Operational Support				Bank and Vendor			
Backup				Hosting Provider			
Business Continuity Planning & DR Provisioning	Bank	Bank and Hosting Provider	Bank	Bank and Hosting Provider			
Asset Management						Bank	Bank and Provider
Examples	FIS Miser, MISER-BI (EDW 1.0)	Future: Disaster Recovery (Virtual networking, storage)	BAM+, WirePro; and vendors Abrigo, Centurion	RingCentral, ServiceNow, Cisco VoIP, and future: VMware VCDR for DR Guest Apps	FIS IBS, FIS ImageCenter, Q2, McCracken, Remote Lender, Verafin, DMI Mortgage, Axiom; and Google Workspace; and future: IBM Blueworks, FOS	EDW 2.0 (future), AppleNet Intranet, Report Development, IT Scripting	

*As related to the Operations/Infrastructure. Sourced from the IT Operating Model Standards v1.0, published to AppleNet on September 17, 2021.

Apple Bank
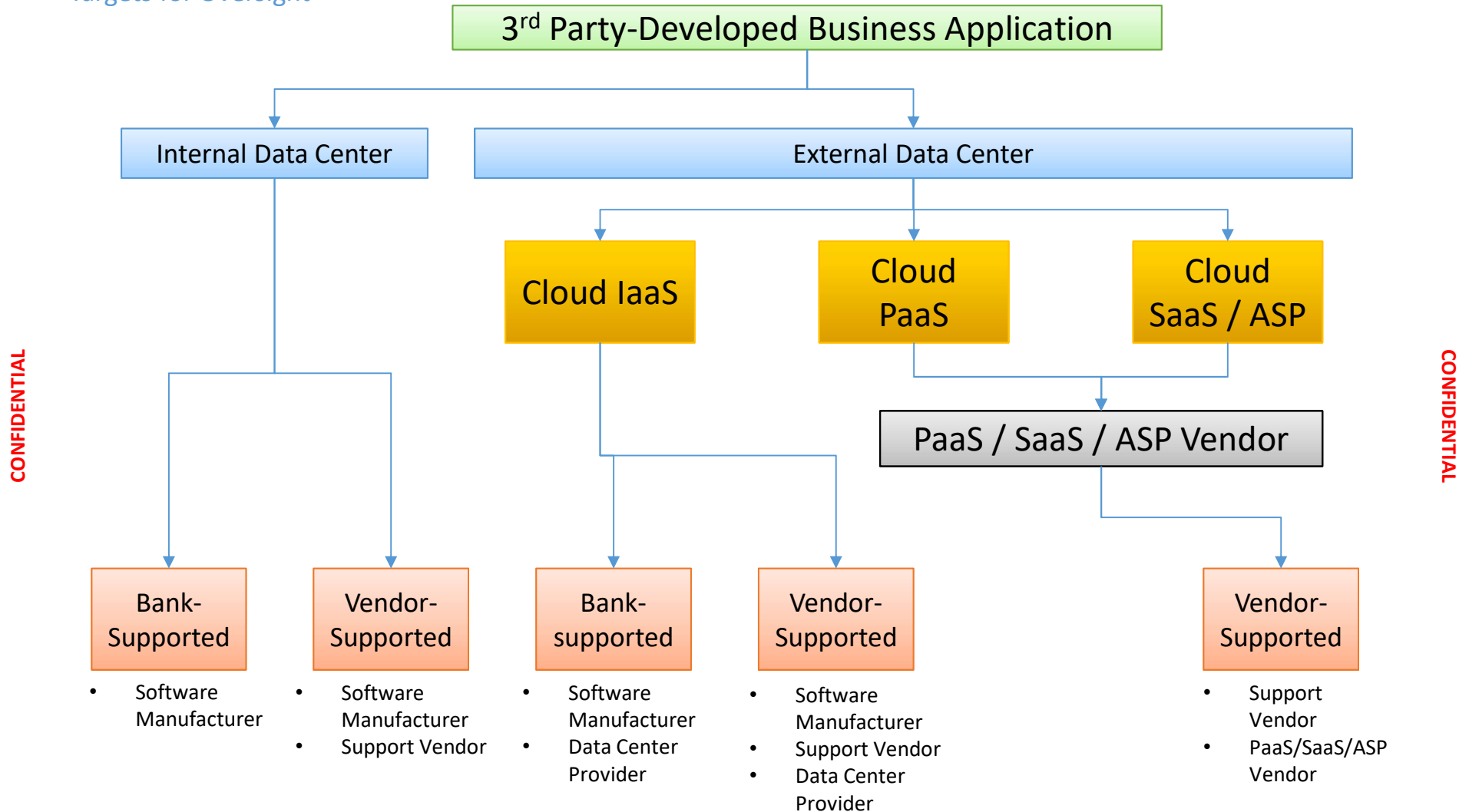
10

Cloud Service Models to Apple Bank IT Operating Model*

CONFIDENTIAL

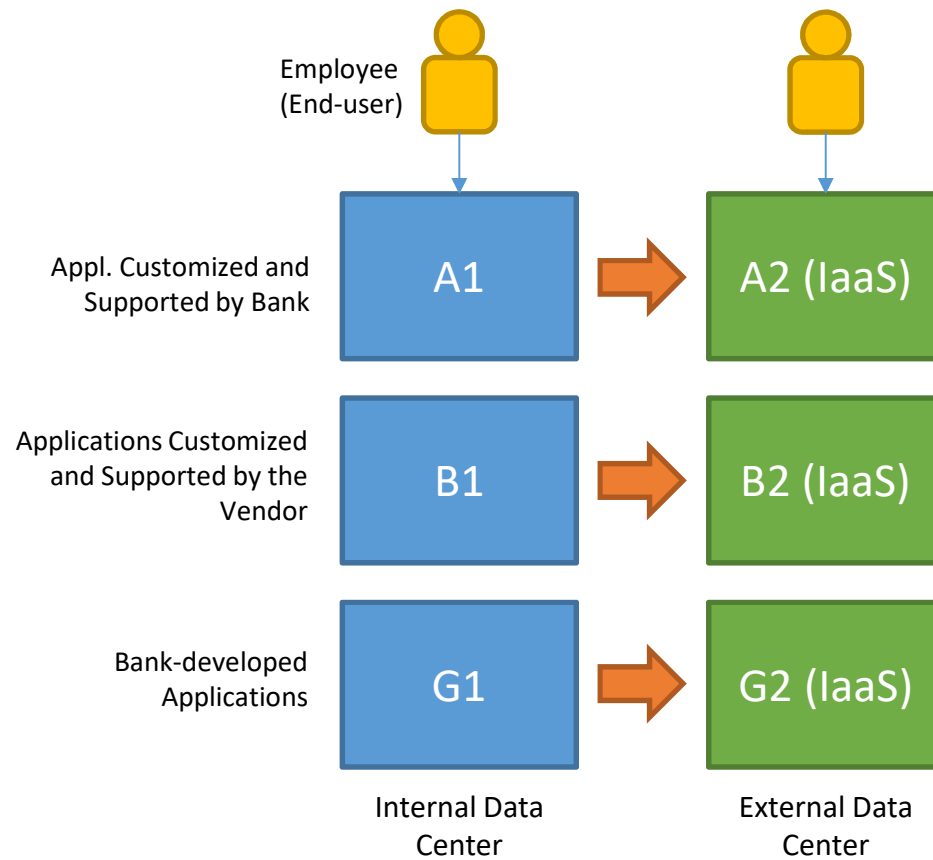|	A1	A2 — *IaaS*	B1	B2 — *IaaS/PaaS*	B3 — *SaaS/ASP*	G1	G2 — *IaaS*
Description	Appl. Customized and Supported by Bank		Applications Customized and Supported by the Vendor			Bank-developed Applications	
Hosting Model	Internal Data Center	External (Cloud IaaS)	Internal Data Center	External (IaaS, PaaS)	External (ASP, SaaS)	Internal Data Center	External (Cloud IaaS) *Future*
Data Custodian	Bank						
App Uptime (SLA), DR Testing	Bank	Bank & Provider	Bank	Bank & Provider	Hosting Provider	Bank	Bank & Provider
Application Programming, Development	Developer					Bank	
Application Security	Bank		Application Developer & Provider			Bank	
Change Mgmt., Maintenance Updates/Patches, End-user Support	Bank		Application Vendor			Bank	
User Access Administration	Bank						
Data Interfaces to Other Systems	Bank			Bank or Provider	Hosting Provider	Bank	
Examples	FIS Miser, MISER-BI (EDW 1.0)	Future: Disaster Recovery (Virtual networking, storage)	BAM+, WirePro; and vendors Abrigo, Centurion	RingCentral, ServiceNow, Cisco VoIP, VMware VCDR for DR Guest Apps	FIS IBS, FIS ImageCenter, Q2, McCracken, Remote Lender, Verafin, DMI Mortgage, Axiom; and Google Workspace, IBM Blueworks, FOS	EDW 2.0 (future), AppleNet Intranet, Report Development, IT Scripting	

CONFIDENTIAL

Apple Bank

*As related to the Application. Sourced from the IT Operating Model Standards v1.0, published to AppleNet on September 17, 2021.

Vendor Management Oversight Targets

Application Hosting - Future (TBD)

Internally-Hosted Servers/Applications Moved To and Hosted From The Cloud

Employee
(End-user)

Appl. Customized and
Supported by Bank

A1 → **A2 (IaaS)**

Applications Customized
and Supported by the
Vendor

B1 → **B2 (IaaS)**

Bank-developed
Applications

G1 → **G2 (IaaS)**

Internal Data
Center

External Data
Center

Apple Bank

Apple Bank for Savings
122 East 42nd Street
New York, NY 10168
212-224-6400
www.applebank.com

Established 1863
Member FDIC

Apple Bank