Designing a Virtualized Real-Time IT System harnessing Cloud Technologies

Presentation By
Chandra Mohan Malladi
Tata Consultancy Services

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- Trigger
- Cloud Services evolution
- Guiding Principles for Design
- Typical Cloud Architecture
- Case Study – Bank on Cloud – An Innovation for Inclusion
The Trigger

Organizations in every industry, regardless of size or geography are embracing cloud infrastructure as a way to reduce the complexity and costs associated with traditional IT approaches.

This reality is driven by change in expectations of Customers, Employees and Partners for a need of self service/commodity for consumption of Technology.

Many business solutions are getting deployed on cloud otherwise it remained as dream.

The economics of computing are changing as organizations access

- World-class computing power
- 24*7 available anytime, anywhere.
- Faster delivery of higher-value products
- Services is now mandatory to address formidable competition and escalating customer and shareholder expectations.

Cloud-based, real-time systems can help save approximately more than 75% in business insight-related costs.
Cloud Services / Cloud Computing?
Everyone talks about the cloud – What is it?

Cloud computing - a new IT buzzword...

“Cloud Services describes a new delivery model for IT services, it typically involves the provision of dynamically scalable and often virtualized resources as a service over the Network.”

"The concept, quite simply, is that vast computing resources or applications will reside somewhere out there in the ether (rather than in your computer room) and we'll connect to them and use them as needed."

“...it is a pay-per-use model which provides convenient network access to shared pool of computing resources (network, servers, storage, applications, services etc) that can be provisioned rapidly and on-demand with minimum service provider interaction”

Cloud computing evolution

**Grid Computing**
- Solving large problems with parallel computing
- Made mainstream by Global Alliance

**Utility Computing**
- Offering computing resources as a metered service
- Introduced in late 1990s

**SaaS Computing**
- Network-based subscriptions to applications
- Gained momentum in 2001

**Cloud Computing**
- Next-Generation Internet computing
- Next-Generation Data Centers
ISP to Cloud evolution

Internet Service Provider (ISP) 1.0
Access to the Internet (set-up, sell, T1, T3)

ISP 2.0
Access to Servers

Colocation (ISP 3.0)
Access to your equipment

Application Service Provider (ISP 4.0)
Hosted Applications on Servers

Cloud (ISP 4.0)
Dynamic, Internet Optimized Infrastructure for Hosting Applications

ISP to Cloud evolution

Types of Cloud

Private Cloud
Private cloud is infrastructure operated solely for a single organization, whether managed internally or by a third-party and hosted internally or externally. These services are managed and provided within the organization.

Public Cloud
The service provider makes resources, such as infrastructure, applications or storage, available to the general public over the Internet. Public cloud services may be free or offered on a pay-per-usage model.

Hybrid Cloud
This is a combination of services provided from public and private Clouds.
Infrastructure Management – Before & after cloud services

<table>
<thead>
<tr>
<th></th>
<th>Before Cloud / Virtualization</th>
<th>After Cloud / Virtualization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computing resource request mechanism</td>
<td>Manual / Online</td>
<td>Online portals with on-demand availability</td>
</tr>
<tr>
<td>Time to get computing resource</td>
<td>In days to month</td>
<td>Few minutes</td>
</tr>
<tr>
<td>Computing resources</td>
<td>Dedicated physical servers</td>
<td>Virtualized Servers</td>
</tr>
<tr>
<td>Infrastructure Cost</td>
<td>High</td>
<td>Pay-Per-Use model</td>
</tr>
<tr>
<td>Manpower Cost</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

Design guiding principles

Cloud technology Infrastructure should create Trust, confidence and dependability to the End customer.

To enable this following guiding principles are generally kept in mind:

- Open Architecture – Should not lock into a technology platform
- Modular Architecture – Flexible to choose
- Loosely couple and tightly integrated
- Seamless Integration Capability
- Data Integrity & Reconcilability
- Secured and Clean transaction processing
- Scalable and robust
- User friendly and ease of use
- Environment Friendly – Should conserve minimum energy resources
- Aligned with Standard operating Procedures and Process of the Business industry
- Transparency to stake holders
- Necessary controls built in
Case Study – Banking on Clouds
An Innovation for Inclusion

Inclusion Need
- Micro credit & insurance
- Rural CBS
- NREGA
- SHGs
- Weather Forecast
- Financial Inclusion
- Subject Market Expertise
- Debit Card - POS

ENGINEERING SUSTAINABLE SOLUTIONS
13 December 2011
Challenges

Exclusion
- 42% excluded population
- < 30% have access to formal credit delivery
- < 10% have health insurance

Govt. Benefits
- Over ₹100,000 cr of govt. schemes disbursements
- >70% does not reach the intended beneficiary

AADHAR
- Success relies on last mile of enrollment & usage

Commercial organizations
- Focus on rural segment as an untapped market
- Seeks digital payment mechanisms

The Innovation Context

Majority a/cs inactive

Competition landscape – small players

Fragmented pilots implementing point solutions

Location dependence, limited functionality
### Solution Components Design

<table>
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<tr>
<th>Solution Component</th>
<th>Guiding Principle</th>
<th>Options/Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Device</td>
<td>Channel Agnostic – Independent of channel devices</td>
<td>POS, Kiosk/Laptop, ATM, Mobile</td>
</tr>
<tr>
<td>Cards</td>
<td>Smart card as an option – With/Without cards solution</td>
<td>Card based (Contact/Contact less, Java/Scosta/Magnetic strip cards or without card)</td>
</tr>
<tr>
<td>Authentication</td>
<td>Different types of Authentication methods suitable to the channel</td>
<td>Biometric – Fingerprint, voice, PIN Based, Single/Multiple</td>
</tr>
<tr>
<td>Key Management</td>
<td>Flexible Key Generation and Injection process</td>
<td>Option 1: Bank generate the key and inject on to the smart card, TSP can provide application to inject the key Option 2 : TSP can generate and inject keys</td>
</tr>
<tr>
<td>Card Management</td>
<td>Follow open standards and regulatory compliance</td>
<td>Compliance to IDRBTS guidelines for smart cards and complete card life cycle management</td>
</tr>
<tr>
<td>ATM Switch</td>
<td>Standard and proven switch</td>
<td>Hosted Switch/Interface with Bank’s switch</td>
</tr>
<tr>
<td>Gateway Application</td>
<td>To take care of front end channels and back end processing systems, act as central application manager and manage unified user experience</td>
<td>Terminal Authentication Parameter Management Central Biometric Authentication Integration with multiple Back end systems</td>
</tr>
<tr>
<td>Loan Origination System</td>
<td>Complete automated loan appraisal process</td>
<td>LoS – Retail, Group and Corporate appraisal and monitoring</td>
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<td>Multi Lingual</td>
<td>Display, Printing, Voice</td>
<td>Support to local Languages</td>
</tr>
<tr>
<td>Security</td>
<td>End to End Secured Transaction capturing and processing</td>
<td>SSL Certified, Token system, Encryption, Key based authentication, Two factor, transaction level passwords etc. appropriate security mechanism is enabled with respective channel</td>
</tr>
<tr>
<td>Mode of Operation</td>
<td>Should be capable to provide services by Bank teller, Business Correspondent Agent, Self service by Customer</td>
<td>Bank teller/BC Agent/Self service</td>
</tr>
<tr>
<td>Partner system Integration</td>
<td>Follow open standards</td>
<td>Standard integration methods with partner systems E.g. ISO, XML, Web services</td>
</tr>
<tr>
<td>Customer Personalized services</td>
<td>Ability to provide information required for this segment of customer and reduce the cost of transaction by offering wide range of services through this platform</td>
<td>- Value Added Services – Customer/Agent personalized services - Enable Cash less transactions – Bill collection/payments - Agricultural Information Services</td>
</tr>
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Enable Win-Win situation for all stakeholders
Innovation components

- **Low entry cost non-linear technology model**
  - Bank in Box on Cloud
  - Open standards enabling plug-n-play of multiple devices
  - FI gateway ensuring Integration, Interoperability, Transaction integrity
  - Tools approach for monitoring of field operations, training etc.

- **Collaborative service delivery approach (~20 partners currently in ecosystem)**
  - Engagement of grassroot level partners for last mile service delivery
  - Co-innovation partnerships with device, telecom companies
  - Leveraging Tata Group companies

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**Remittance Transaction Flow**

Lift man
Mankhurd, Mumbai

Sending Bank
Mumbai

NPCI
Hyderabad

Receiving Bank
Delhi

Family
Kulharia, Bihar

ISO 8583 format

< 10 seconds

- Sender Mobile number and MMID verification
- MPIN validation
- Sender a/c identification
- Debit to the Sender’s a/c
- Generate and send transaction
- SMS confirmation to the sender

- Receiver mobile number and MMID verification
- Receiver a/c identification
- Credit to the Receiver’s a/c
- Generate and send transaction response
- SMS confirmation to the receiver
Sample Transaction Flow

- Bank payments
- Govt. Payments
- Micro-Insurance/ lending
- Other similar types of payments
- Information services

Rural Gateway

Transactions

Core Backend

Micro ATM
- Online
- Biometric
- Voice Playback
- Local language
- Card / Cardless

GPRS/PSTN

Govt. UID servers for authentication

Impact
Landscape

Fatehgarh Sahib; Muktsar, Shamshernagar
Sachakhera, Rohtak, Gurgaon
Bikaner, Bhilwara
Baroda/Anand/Panchmahal, Valsad, Ramol, Kuha, Polithana, Kalol
Chhindwara, Khandwa, Bhind, Morena, Warangalapur
Pune
Rampur
Hebbur, Tumkur
Trivendrum, Ernakulam, Kozhikodu

Planned coverage 16mn customers in 22000 villages in Phase 1
Benefits

- **Customer**
  - Rs. 10 micro-savings in a/c resulting in ~ ₹ 6000 annual savings
  - Credit history established enabled lending by bank for machine

- **BC Agent**
  - Over 1000 SHGs earning ₹ 3000-4000 pm as BC agents

- **Government**
  - 10%-15% reduction in govt. disbursement due to wrong/non-existent beneficiaries

- **Bank**
  - Savings balances ₹8 lacs & credit off take of ₹3-4 lacs in sample districts

1.4 mn customers being serviced across 5700 villages

**Expected Benefit Flow**

- **BC Agents**
  - Earning in native place
  - Over 22,000 VLEs can earn over Rs. 4,000 per month
  - Improved employability

- **Tech Service Provider**
  - ₹XXXX crs
  - New line of business.
  - Opportunity to participate in transformation of rural India.

- **Govt**
  - Savings of >30%
  - Govt benefits such as NREGA, SSP (pension) and direct subsidies to reach the intended beneficiary

- **Banks**
  - 25% growth in customer base
  - Retail, fertilizer, insurance sector reach into villages

- **Corporates**
  - ₹ 20000 crs
  - New line of business.

Creating a sustainable, multi-service rural distribution channel
• The ‘rural’ segment is **not synonymous** with poor and deprived

• The rural population **deserves and aspires** for quality products and

• Technology is a powerful tool, which cuts across **class, caste, gender, infrastructure outreach, size of transaction**

THANK YOU