1 Billion Smartphones a Year and Counting

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Agenda

• It’s a Mobile world!
• CICS mobile enablement options
• z/OS Connect and CICS: an evolution
  • Compare and contrast
• CICS TS and IBM MobileFirst Foundation
• Setup and demo of z/OS Connect in CICS
It’s a Mobile world
There are currently more than 1,038 billion smartphones in use.

That’s 1 out of every 6.7 people on the planet.

Mobile users are five times more likely to abandon the task if the site isn’t optimized for mobile.

79% will search for another site to complete the task.

Media tablet sales:

- In 2012, 118.9 million.
- By 2016, 369.2 million tablets will be sold.

1 billion smartphones sold in the last 16 years:

- The next one billion will be sold in just the next 2 years.

Google estimates by 2013, more people will use mobile phones than desktop PCs to go online.

Global mobile vs. desktop internet user projection, 2007-2015:

- Mobile internet users:
  - Source: Morgan Stanley Research.
>50% Smartphone adoption in 9 countries now

WW Smartphone adoption 2012-18

Source: emarketer.com
Mobile: Another stage in computing history

Mobile is different:
• Ubiquitous computing
• Mixed models – web/native/hybrid
• A different type of app – context aware
• Revolutionary to business models

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"Flipkart would move to an app-only format within a year"
Figure 1.9 Most important device for connecting to the internet: 2013-2015

Proportion of internet users (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Smartphone</th>
<th>Laptop</th>
<th>Tablet</th>
<th>Desktop</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>15%</td>
<td>23%</td>
<td>46%</td>
<td>33%</td>
<td>3%</td>
</tr>
<tr>
<td>2014</td>
<td>16%</td>
<td>40%</td>
<td>30%</td>
<td>28%</td>
<td>3%</td>
</tr>
<tr>
<td>2015</td>
<td>15%</td>
<td>15%</td>
<td>19%</td>
<td>20%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: Ofcom Technology Tracker, Data from Q1
Base: All adults aged 16+ who use the internet at home or elsewhere
QE11(QE40): Which is the most important device you use to connect to the internet, at home or elsewhere? ‘Other’ includes: ‘netbook’, ‘games console’, ‘other device’, ‘none’ and ‘don’t know’. Ranked by 2015

https://twitter.com/BenedictEvans/status/629157862732738564

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Even though the world is awash in unstructured data, it’s the **transactional data** that decision makers are focused on right now. And since the mainframe holds the vast majority of that data, it has a real role to play.

80% of world’s corporate data resides or originates on mainframes.
CICS mobile enablement options: *The story so far*
CICS mobile enablement – solution complexity

The level of “friction” between SoE & SoR data models determine the complexity of the enablement solution

“Zero-code” solution

WSBind-based solutions
- Based upon tooling not coding
- Creates re-usable assets
- Ideal for top-down / bottom up
- Simple to use with fast ROI
- Less flexible in terms of data transformation options

Custom adapter / RESTful web app
- Based upon bespoke integration code
- Can always integrate between independent SoE and SOR worlds
- Code must be written somewhere e.g.
  - JAX-RS application in WAS or CICS Liberty profile

Composite solutions might also use MobileFirst adapters, or CICS-COBOL wrapper with any of the above

Simplicity vs Flexibility

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Topology #1: CICS Liberty JAX-RS

- **Web Service provider:** CICS Liberty
- **Data transform:** Bespoke/custom user code
- **CICS integration:** Direct LINK
- **Base release:** CICS TS V5.1

_Bespoke transformation e.g. JZOS classes for Data Access_
What are WSBind files and the assistants?

- **Bottom-up existing SOR applications**
  - Language Structures

- **Top-down SOAP/XML web services**
  - WSDL

- **Top-down JSON web services**
  - JSON schema

**WSBind file**
- Generated by off-line tooling e.g. *DFHLS2JS*
- Stored on zFS
- Maps data between a **web service** and an SOR **language structure** representation at run time
  - e.g. *JSON schema to COBOL copybook*

**CICS web services and JSON assistants**

**offline tooling**

**For the consumer of the web service**
- e.g. mobile app developer

**For the SoR developer**
- e.g. COBOL, C, PL/I developer

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Topologies #2: CICS TS JSON web services

- **Web Service provider**: CICS JSON web services
- **Data transform**: WSBind files
- **CICS integration**: Direct LINK
- **Base release**: CICS TS V5.2

A.k.a. “CICS TS Feature Pack for Mobile Extensions” (V4.2, V5.1)
Topology #3: CICS TG JSON web services

- **Web Service provider**: Liberty (embedded)
- **Data transform**: WSBind files
- **CICS integration**: Standard CICS communications
  - enables z/VSE, TXSeries, and “i” integration
- **Base release**: CICS TG V9.1

Multiplatforms OS or z/OS

- CICS TG V9.1
- Liberty *(private embedded)*
- Dedicated web app
- JSON data
- Binary data

z/OS

- CICS TS
- PROGX
- CICS comms
- Binary data

HTTP(S)

JSON data

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What is z/OS Connect?
The API Economy
Where companies [providers] expose their (internal) digital business assets or services in the form of (Web) APIs to third parties [consumers] with the goal of unlocking additional business value through the creation of new assets.
It’s about getting REST and JSON into your mainframe environment in a way that enables you to best take advantage of the assets that exist there:

REST – Representational State Transfer … the use of HTTP URLs that map to a ‘service’, such as ‘query account’ or ‘update data’

JSON – JavaScript Object Notation … a standard of representing data as a set of name/value pairs. This is passed back and forth along with REST request/responses

Where z/OS Connect fits

z/OS Connect

• Liberty Profile Server
• Function IBM wrote to run in Liberty Profile
• No charge function provided with license entitlement for WAS z/OS, CICS or IMS customers

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Why z/OS Connect?

This represents another component to configure and maintain in your environment. So what value does it bring?

- Provides a common and consistent entry point for mobile access to one or many backend systems
- Java, so runs on speciality engines
- Shields backend systems from requiring awareness of RESTful URIs and JSON data formatting
- Provides point for authorization of user to invoke backend service
- Provides point for capturing usage information using SMF
- Simplifies front-end functions by allowing them to pass RESTful and JSON rather than be aware of or involved in data transformation

You could enable Mobile access without z/OS Connect

z/OS Connect simplifies and makes the environment more consistent and manageable

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Different Delivery Approaches

WAS z/OS

Delivered as function that runs inside Liberty Profile z/OS. Initially will use WOLA (WebSphere Optimized Local Adapters) to access backend.

CICS

Delivered as part of Liberty Profile that runs inside of CICS region with a JCICS local LINK, and CICS TG using standard CICS ISC connections.

IMS

Liberty Profile with z/OS Connect inside. IMS z/OS Connect uses JCA* to talk to IMS Connect to get access into IMS.

These different delivery mechanisms tend to obscure the main story of what it is and how it works, so for now let’s stipulate IBM offers several ways to get this and now focus on some details

* A supplied IMS JCA resource adapter, as opposed to the local adapter support

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Context within Mobile Architecture

The message here is that z/OS Connect is a *piece* of the Mobile architecture, but in most cases will not be the only component:

Users of z/OS Connect would access through normal corporate firewall infrastructure.

IBM MobileFirst Platform to provide application management, security and operational governance for mobile applications.

z/OS Connect would be behind the secure firewall, and on LPARs along with backend systems.

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z/OS Connect is software function that runs in a Liberty Profile

z/OS Connect is described and configured in the Liberty server.xml file

z/OS Connect is designed to accept RESTful URIs with JSON data payloads

One part of z/OS Connect is a servlet that runs in Liberty Profile

A ‘Service Provider’ is software that provides the connectivity to the backend system

z/OS Connect provides the ability to transform JSON to the layout required by backend

‘Interceptors’ are callout points where software can be invoked to do things such as SAF authorization and SMF activity recording

Initially the backend systems supported will be CICS, IMS and Batch

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z/OS Connect and CICS
Topography #4: WAS z/OS Connect

- **Web Service provider**: WebSphere Liberty on z/OS
- **Data transform**: WSBind files
- **CICS integration**: WebSphere Optimized Local Adapter (WOLA)
IBM CICS Transaction Server V5.3 open beta

corporate grade mixed language application serving

**Service Agility**
Enhanced support for Java and the WebSphere Liberty profile

**Operational Efficiency**
Performance optimizations, enhanced metrics and additional security

**Cloud with DevOps**
New cloud and DevOps support to automate CICS deployments

- Additional Liberty features
- Enhanced interoperability
- Simplified management
- Enhanced Java SE support

- Web service optimizations
- Performance improvements
- Enhanced metrics
- Additional security options

- Automated builds
- Scripted deployments
- UrbanCode Deploy support
- Enhanced cloud enablement
The CICS TS V5.3 open beta offering also includes a technology preview of the ability for Java programs in a Liberty profile JVM server and non-Java programs to call each other using standard CICS API calls. This technology preview enables:

- Java applications to use the standard JEE Connector Architecture (JCA) to invoke CICS programs in any supported language.
- Non-Java CICS programs to issue an EXEC CICS LINK to call a Java application running in a Liberty profile JVM server.

Additionally, the **Liberty z/OS Connect** feature is now supported by the CICS TS V5.3 open beta offering*. This provides RESTful APIs and accepts JavaScript Object Notation (JSON) payloads between CICS, mobile devices, and cloud environments.

* Also available in CICS TS V5.2 via APAR PI25503.
**Web Service provider:** CICS TS z/OS Connect (embedded)

**Data transform:** WSBind files

**CICS integration:** Direct LINK

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Now available!

- **CICS TS V5.3 open beta** includes embedded z/OS Connect
  - Also available in **CICS TS V5.2 via APAR PI25503**

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<table>
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<th>Product</th>
<th>Delivery vehicle</th>
<th>Characteristics</th>
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</table>
| CICS TS for z/OS              | CICS Mobile Feature pack                               | ✓ Proximity to data  
✓ Integrated with CICS admin  
✓ Outbound invoke |
|                               | • CICS TS V4.2, V5.1                                   |                                                                   |
|                               | JSON web services                                     |                                                                   |
|                               | • CICS TS V5.2, or later                               |                                                                   |
|                               | CICS z/OS Connect                                     | ✓ Proximity to data  
✓ Service management +  
APIM integration |
|                               | • CICS TS V5.2 PTF                                     |                                                                   |
|                               | • CICS TS V5.3 open beta                              |                                                                   |
| CICS TG products              | JSON web services                                     | ✓ CICS TS family + TXSeries  
✓ Choice of platforms including  
cloud e.g. SoftLayer |
|                               | • CICS TG V9.1                                        |                                                                   |
|                               | • CICS TG V9.2 open beta                               |                                                                   |
| WAS for z/OS                  | WebSphere Liberty z/OS Connect                        | ✓ Multiple z/OS subsystems  
CICS, IMS, Batch  
✓ Service management +  
APIM integration |
|                               | • WAS for z/OS V8.5.5.2                                |                                                                   |
|                               | Liberty repository feature                             |                                                                   |

WAS for z/OS + CICS TS for z/OS both also offer JAX-RS through Liberty
CICS mobile enablement – Product options

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<tr>
<td></td>
<td></td>
<td>• Multiple z/OS subsystems</td>
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<tr>
<td></td>
<td></td>
<td>• Choice of platforms including cloud e.g. SoftLayer</td>
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<tr>
<td></td>
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<td>• Service management + APIM integration</td>
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</table>

Each of these solutions share common code for both tooling and run time to transform data between JSON and binary representations.

Data transformation for CICS programs is based around “WSBind” files. They represent the SOR data structure and enable the run-time transformation for JSON web services.

WAS for z/OS + CICS TS for z/OS both also offer JAX-RS through Liberty

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CICS TS and IBM MobileFirst Platform Foundation
Rapid multi-platform development using a single shared codebase

From the complexity of many...
• Multiple sets of tools & frameworks
• Four codebases to develop and maintain

To the simplicity of one
• One development environment
• One codebase to develop and maintain

IBM MobileFirst Platform Foundation

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IBM MobileFirst Platform Foundation components

MobileFirst Studio
Leading tools for native and hybrid development that help maximize code reuse and accelerate development.

MobileFirst Server
Mobile-optimized middleware providing a gateway between applications, back-end systems and cloud-based services.

Client-side runtime components
Runtime client APIs designed to enhance security, governance and usability

Application Center
Set up an enterprise app store that manages the distribution of production-ready mobile apps

MobileFirst Operations Console
An admin GUI with real-time operational analytics for the server, adapters, applications and push services. Manage, monitor & instrument.
MobileFirst iOS Solution standard architecture

z Systems detail

iOS Enterprise App
Platform SDK
iOS Platform

API Management
- APP API Config
- API Mgmt
- API Analytics
- API Assembly

MobileFirst Platform
- Advanced Mobile Access
  - Push
  - Security
  - Node.js
- Version Mgmt
- App Usage
- App Logging
- Mobile Data Store
- Quality Assurance

Solution Specific Components
- IBM Industry Solutions
- Workflow
- Enterprise Content Mgmt
- Business Analytics

Enterprise SOR Interface (Service/API based)

Service Bus
- Service based integration (WebServices)
- Enterprise Data
- Content
- Subsystem WebServices
- Enterprise Systems
- z/OS Connect
- WAS
- CICS
- IMS
- REST services + API Management
- SOAP/XML
- JSON

Push through APNS

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Demo

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Partner with IBM resources for a complimentary Mobile Test Drive:
- Select an entry point such as composing a Bluemix mobile app connected to a system of record, assessing the benefits of Mobile Workload Pricing, leveraging API enablement using API Management or z/OS Connect, building a mobile front end for an existing 3270 app, and others

Benefits:
- Work with IBM mobile specialists to review existing mobile projects, priorities and requirements
- Leverage best practices and subject matter expertise for input into your enterprise mobile infrastructure strategy and enterprise mobile roadmap
- Learn how others accelerate time to value and differentiate their business with mobile projects by integrating high value enterprise data and transactions

Who should be interested?
- Clients that are looking to leverage existing z Systems data and applications via mobile channels to drive more value from mobile initiatives

What is the commitment?
- 1-2 days Discovery that IBM mobile experts facilitate with your business and technical team, followed by a deeper Mobile Test Drive, for up to a two weeks engagement
- IBM will provide complimentary technical expertise and access to resources during the Mobile Drive engagement

Contact: Nathan Brice (nbrice@uk.ibm.com)
http://ibm.biz/MobileTestDrive
IBM Mobile Centers of Competency

- IBM mobile & z Systems integration specialists help you shape your Mobile Enterprise strategy
  - Mobile CoC’s located at 5 IBM Client Centers around the world
  - Leverage experts in enterprise mobile solutions to help you integrate mobile applications with existing systems and access data in your enterprise without compromising security or performance.

- Offerings:
  - Executive briefings
  - Mobile on z workshops: Systems of Record (SoR) in a mobile world
  - Design workshops for mobile enablement and SoR integration
  - Demos and access to mobile technologies, such as MobileFirst Platform on Linux on z Systems
  - Benchmarks, proof of technology (POT) and proof of concept (PoC)

Contact: Erich Amrehn (AMREHN@de.ibm.com)

www.ibm.com/systems/services/clientcenters/mobile