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Implementing a Mobile environment on Linux on System z

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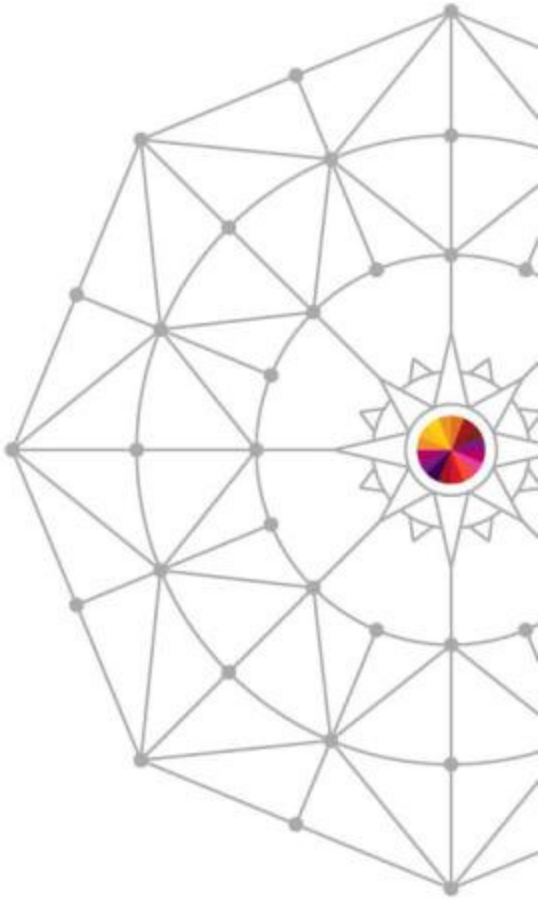
IBM

2014/03/12
Session Number: 15392

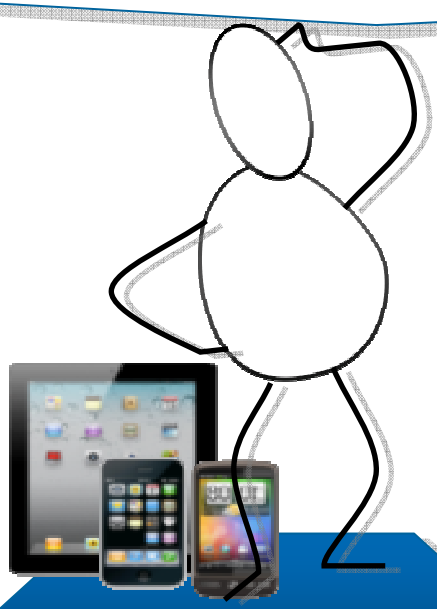


SHARE in Anaheim

What about the mainframe?

The mainframe…
- Home to business critical applications and data

- How do we bridge the gap?

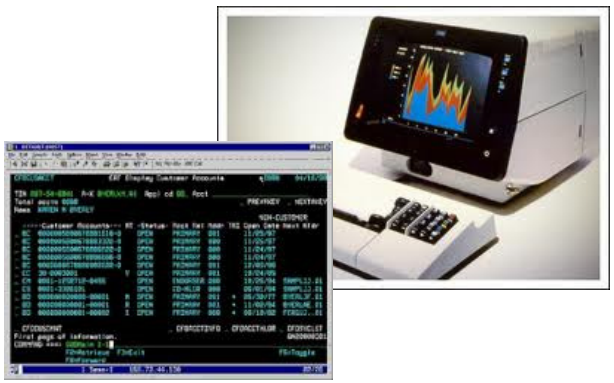


Mobile is changing the way information is used

Information developed using multiple platforms and transformed into web services

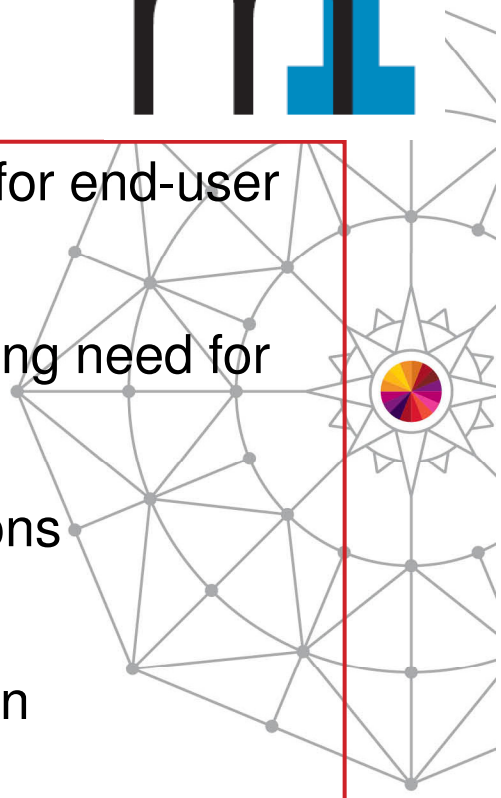
Mobile First

Information restricted and developed in the data center



IBM Research The 2013 Global Technology Outlook

Mobile First

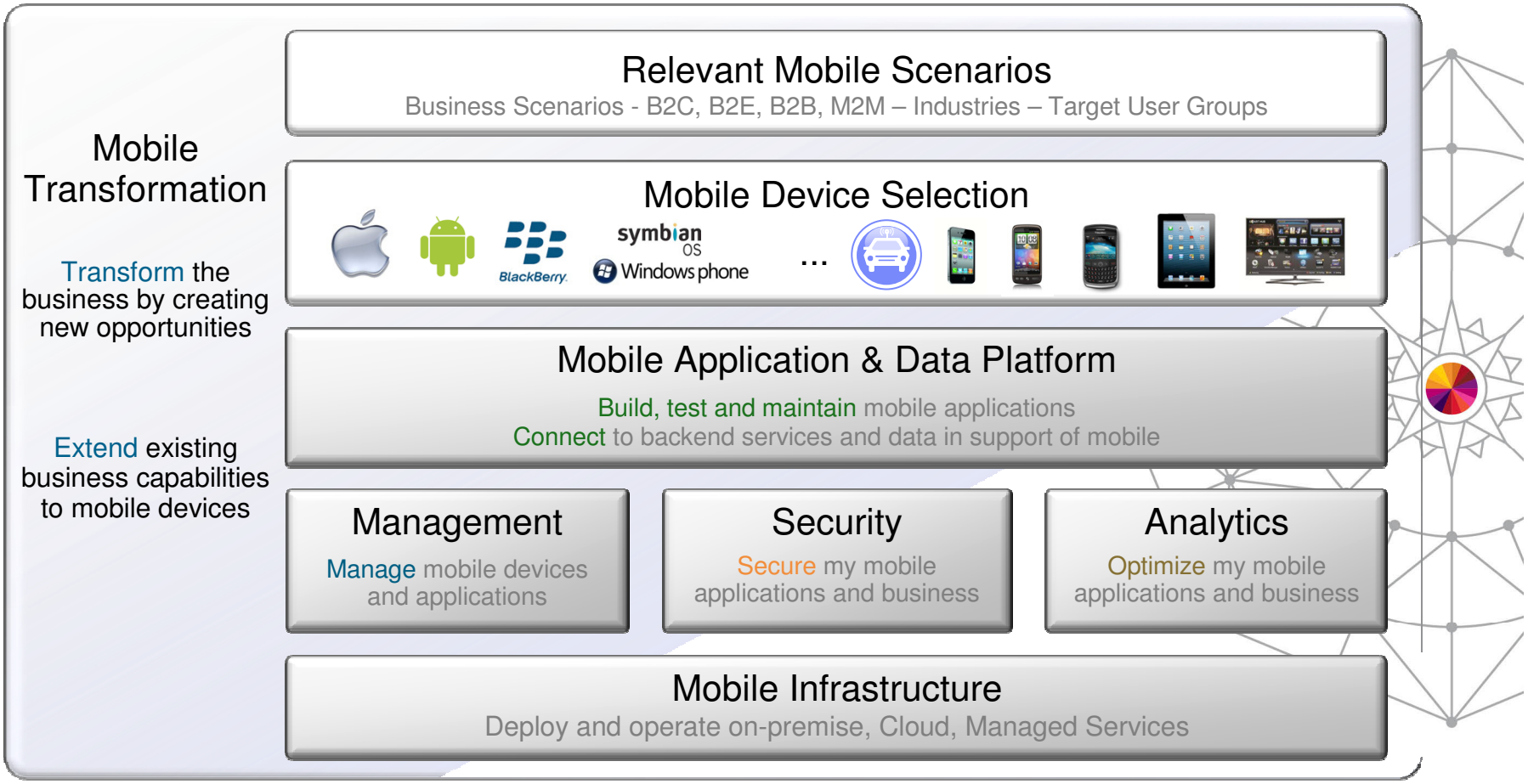


- Mobile devices are emerging as **primary design point** for end-user access to IT
- Consumer access to enterprise data creates an increasing need for enterprise-level security and control
- Mobile First is about: Behavior like **consumer** applications
  - constantly connected clients
  - quickly accomplishing single tasks and then move on
- Is accelerating the integration of cloud, social, and analytics

http://www.b2match.eu/system/softwaredays2013/files/Global-Technology-Outlook-2013_IBM.pdf?1366628169

IBM MobileFirst Enterprise Blueprint

A Guideline to Defining Your Optimized MobileFirst Strategy

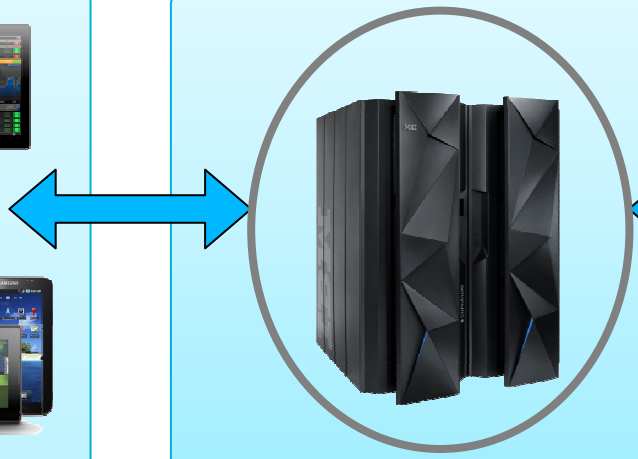


Scenario based Discovery and Architecture Definition, Leading to an Optimized Mobile Strategy

Mobile First - Mobile Applications are Not Miniature PC applications…

	 Mobile Applications	 PC Applications
Usage Context	• User may be in the middle of some other activity (e.g. shopping in a supermarket) • Interactions are short and may be interrupted • Users are very impatient	• Using the application is the primary activity • Interactions are longer and more focused • Users are impatient
Mode of Interaction	• Non-keyboard: touch prevalent, also speech • Typing should be minimized • Screen size/real-estate is small	• Keyboard and mouse • Typing is okay • Larger screen size for presenting information
Other considerations	• Integration with device capabilities (e.g. camera, GPS, accelerometer) • Offline behavior	

Multi-tier Mobile Apps - Specific Challenges



Client Tier Devices

Mobile-specific challenges:
- ✓Lots of device targets
- ✓Provisioning rules and artifacts
- ✓Curated App Stores
- ✓Dependent upon backend service versions

Middle Tier Server

Back-end Data & Services

The Mobile-specific challenges are mainly:
1. Dealing with the **specific issues in the Mobile Client tier**
2. And subsequently **coordinating separate pipelines** for each tier:
   - **Mobile Client**
   - Middleware
   - Back-end data and services

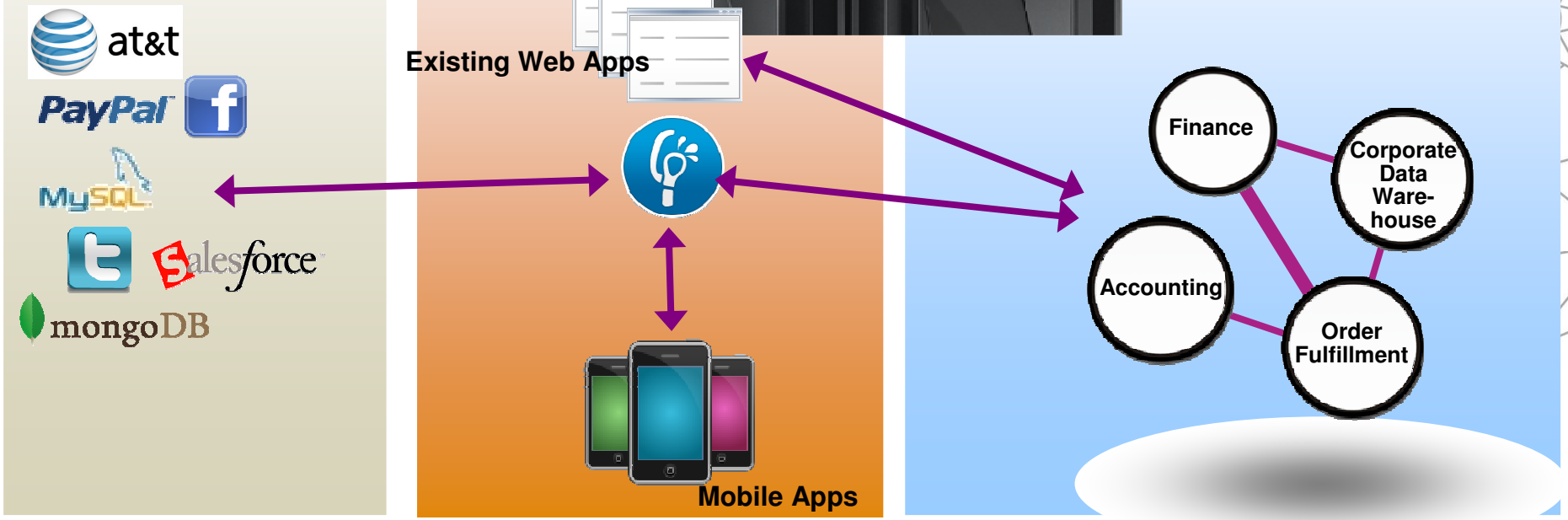
System z - Bridge Systems of Record and Systems of Engagement

Systems of Engagement

Systems of Engagement are cloud-based, decentralized, support rapid app development

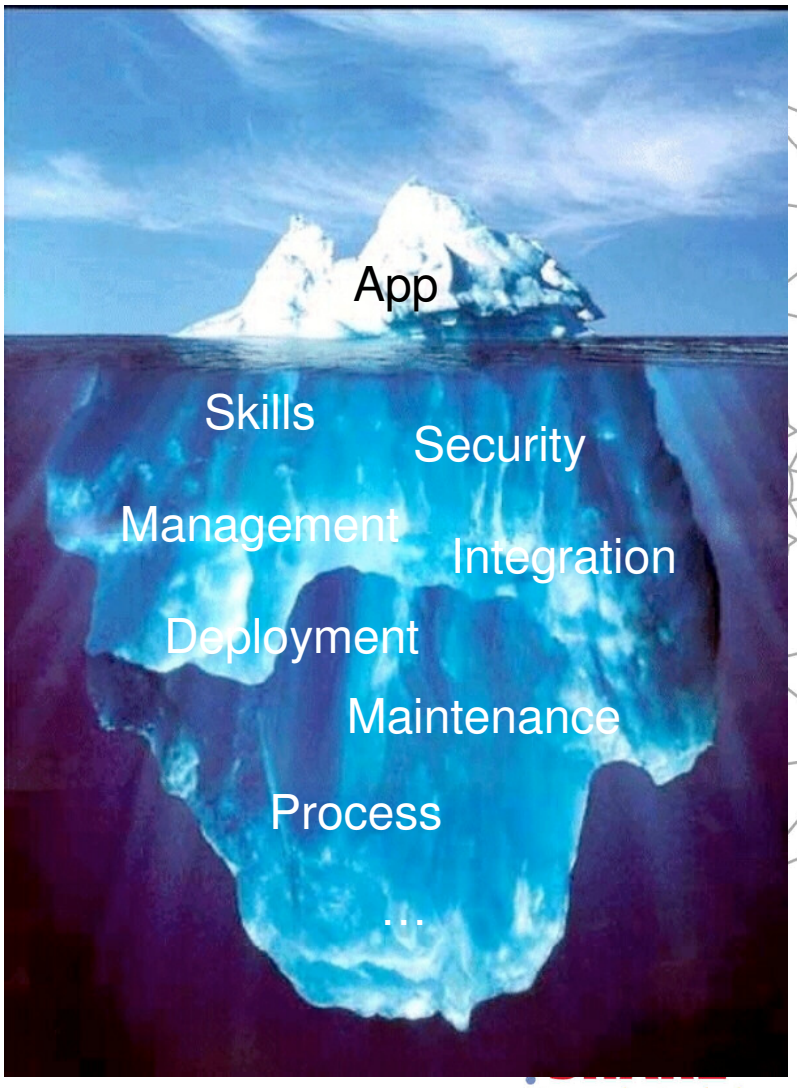
Systems of Record

Systems of Record are well integrated, trusted repositories

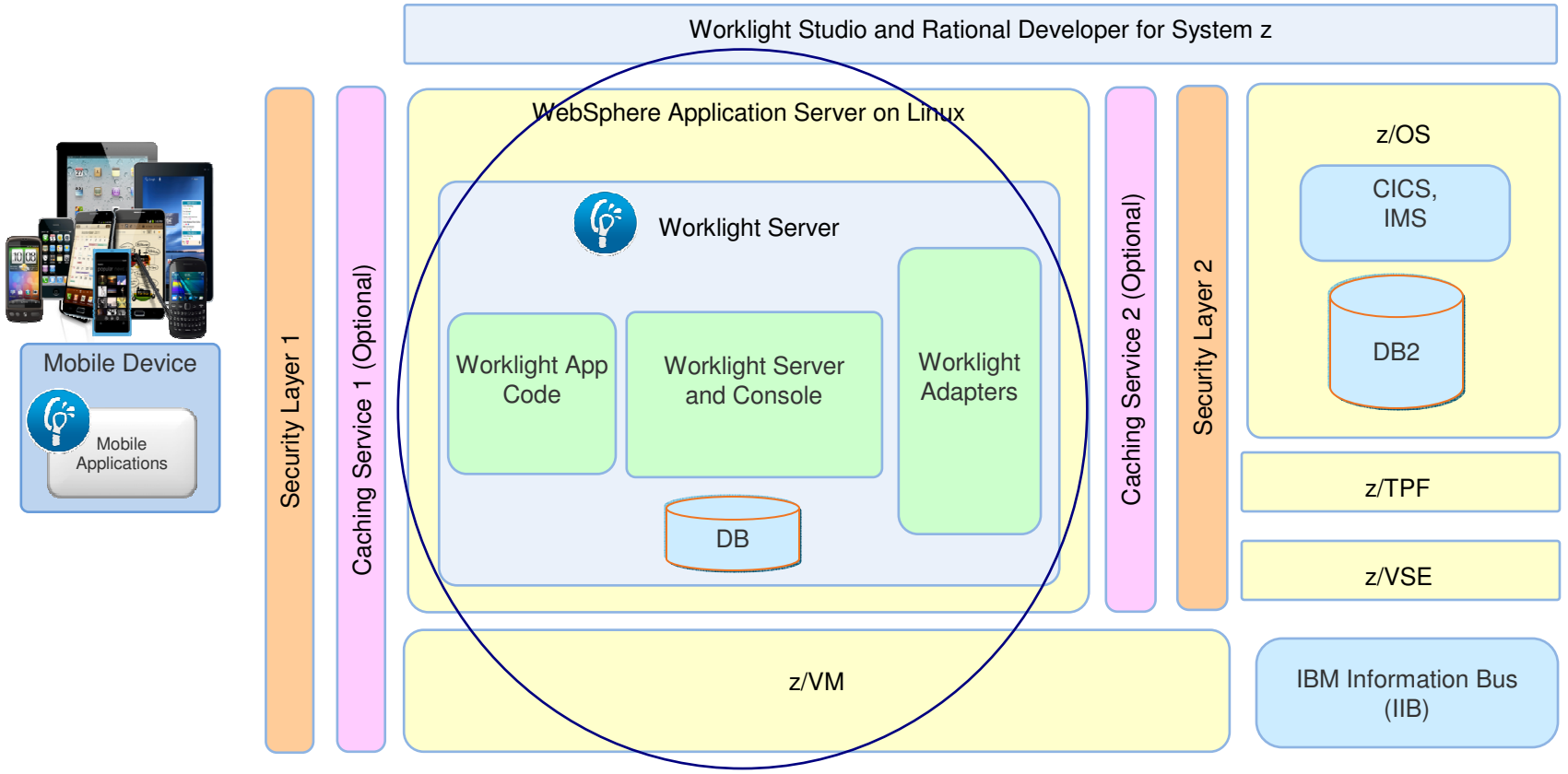


MobileFirst – Adding Mobile Apps Just Isn't Enough

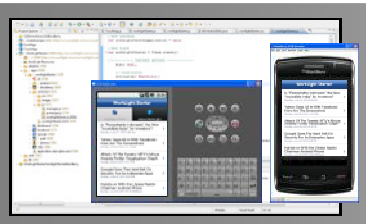
- Mobile as a first choice – overall solution needs to be **optimized to the needs of mobile** users
- Just implementing **a mobile app isn't enough**
- Requires specific **user experience and usability**
- A different set of **security measures** are required for securing mobile applications
- Requires **secure**, **reliable and scalable integration** into your business processes & services
- Vast number of form factors and devices across multiple platforms and licensing conditions & terms require **specific development, testing, deployment and lifecycle management** solutions



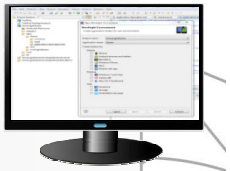
Mobile Architecture Overview for System z

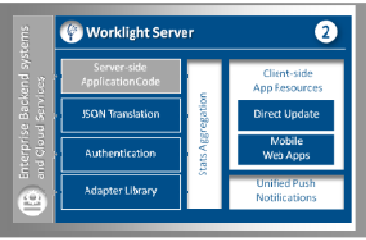


Worklight overview

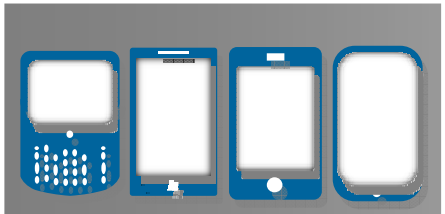


Worklight Studio
The most complete, extensible environment with maximum code reuse and per-device optimization

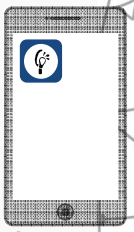


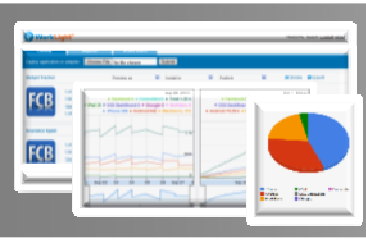


Worklight Server
Unified notifications, runtime skins, version management, security, integration and delivery



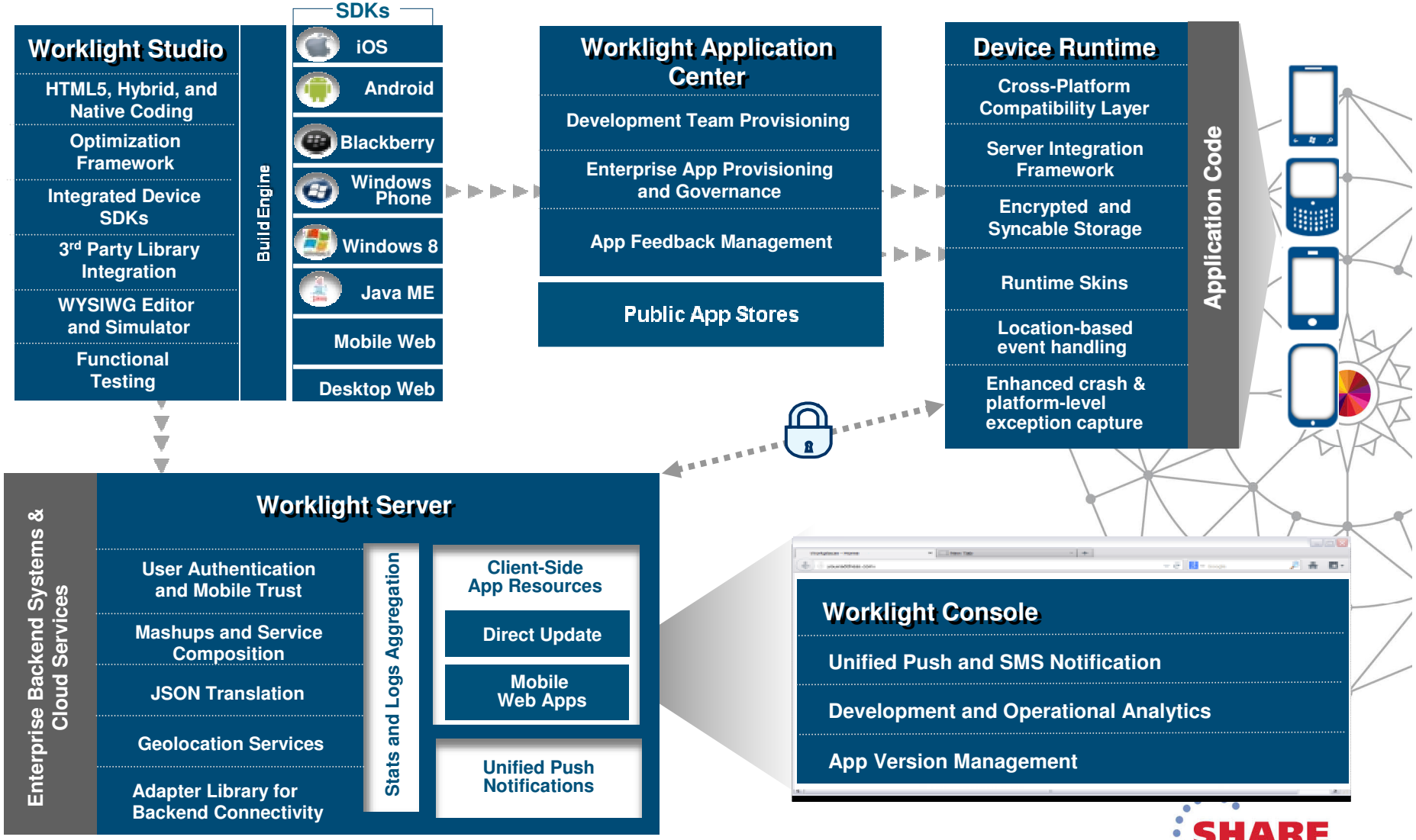
Worklight Runtime Components
Extensive libraries and client APIs that expose and interface with native device functionality





Worklight Console
A web-based console for real-time analytics and control of your mobile apps and infrastructure

IBM Worklight Components Overview

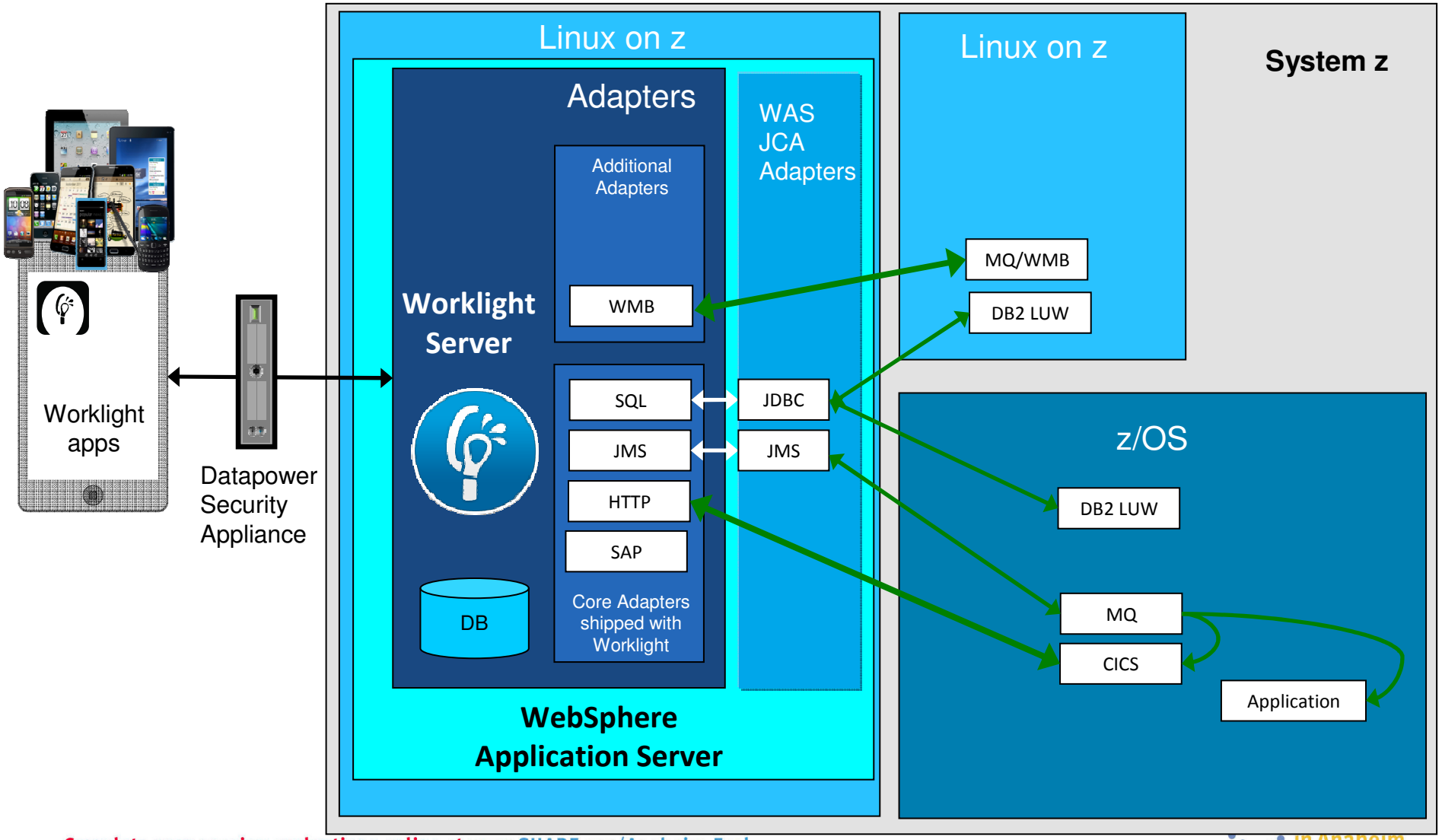


IBM Worklight 6.1 Platform Support

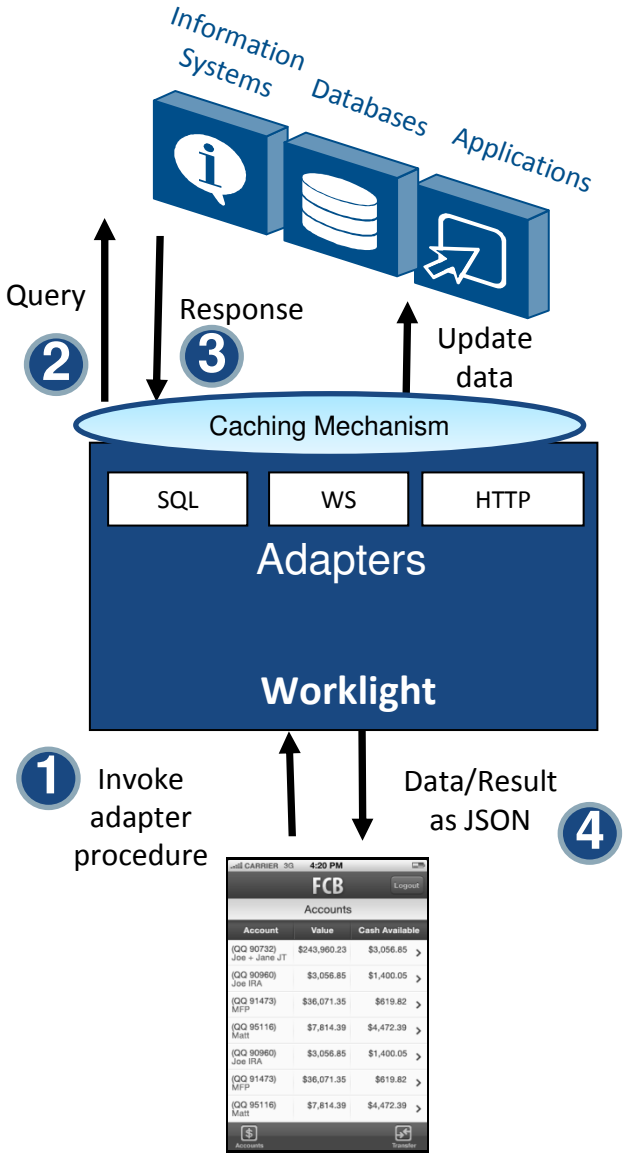
- Supported application server
  - WebSphere 7 & 8 (Distributed | System z Linux)
  - WebSphere 8.5 Liberty Profile (included for Dev only), ND/Base (not included)
  - Apache Tomcat 7 (Linux | Windows | Mac OS X [development])
- Supported databases
  - DB2 Enterprise Server Edition V9.7 or later (DB2 LUW)
  - Apache Derby, SDK 10.8 (included), or later
  - Oracle 11g Database server, Standard or Enterprise Editions, release 1 or later
  - MySQL 5.5
- Supported OS
  - System z Linux SLES 10,11, RHEL 5,6.
  - Apache Ant1.8.1

http://publib.boulder.ibm.com/infocenter/prodguid/v1r0/clarity-reports/report/html/softwareReqsForProduct?deliverableId=66C745D01E8711E28ACF6F870925FE36&osPlatform=Linux

Implementation of a Mobile environment on System z - Functional diagram with WAS and Worklight Adapters



Worklight Server- Adapters



Universality

- Supports multiple integration technologies and back-end information systems

Read-only & Transactional Capabilities

- Adapters support read-only and transactional access modes to back-end systems

Security

- Flexible authentication APIs for back-end connections
- Connected user identity control

Caching

- Leveraged to store data retrieved from back-end

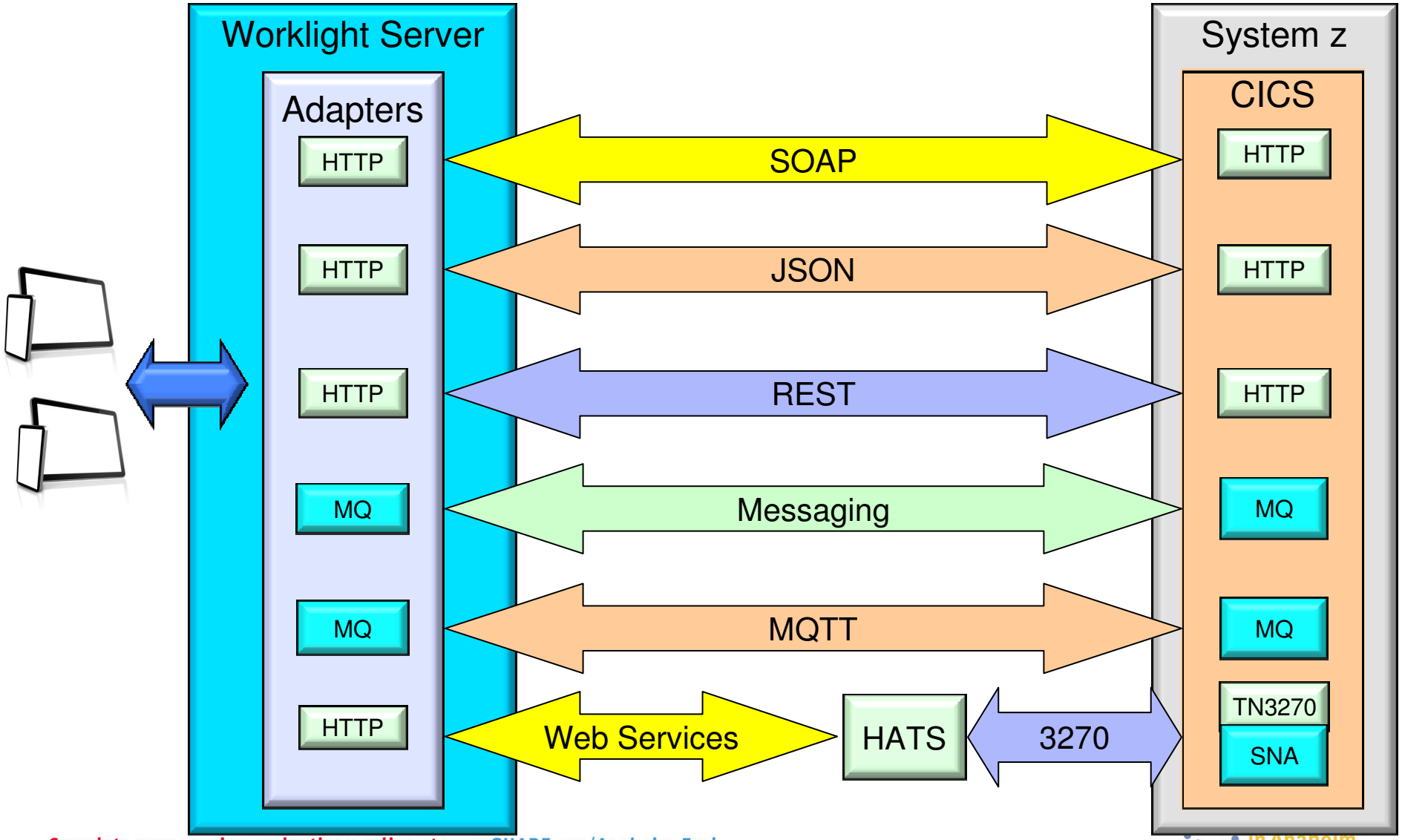
Transparency

- Uniform exposure of back-end data for all adapter types

Fast Development

- Defined using simple XML syntax
- Easily configured with JavaScript APIs

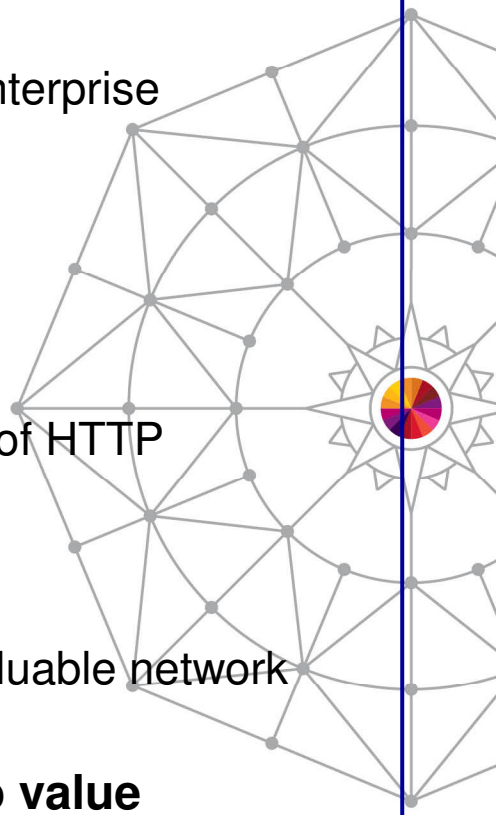
CICS Connectivity Options with Worklight



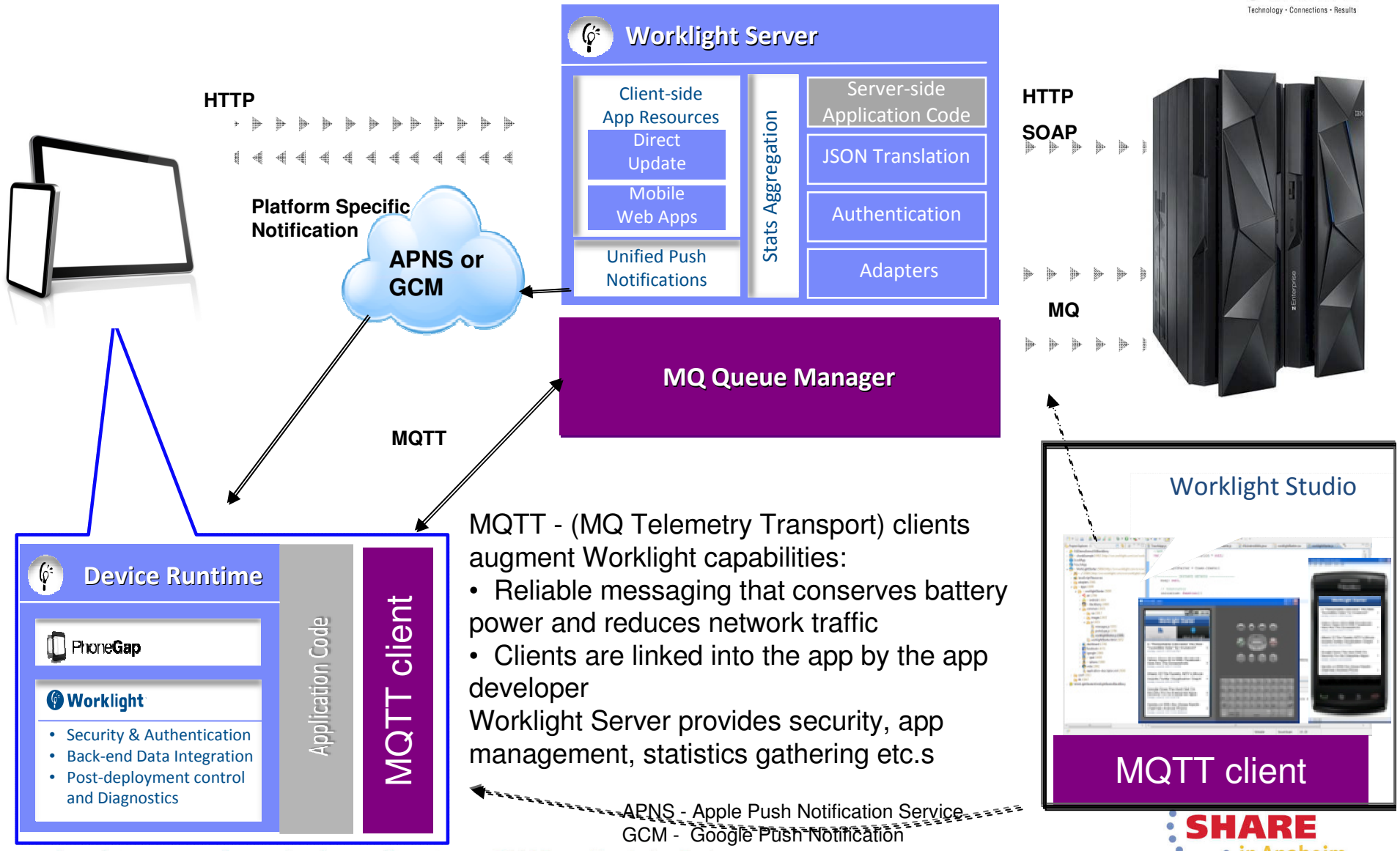
What role does MQTT fulfill in Mobile Messaging?

Reliable messaging that conserves battery power and reduces network traffic

- **Provides a reliable transport**
  - to convey messages from mobile apps to and from your enterprise applications, services and data
- **Provides a Push notification mechanism**
  - No polling required
- **Publish/subscribe paradigm support**
  - A single message can go to multiple devices
  - Great for push notifications and a big advantage over use of HTTP
- **Helps conserve battery & bandwidth**
  - Very light footprint from a client code perspective
  - Less chatty protocol than HTTP solutions so conserves valuable network bandwidth
- **Eases application development costs & speeds time to value**
  - great integration to products such as WebSphere Message Broker to easily enable access to enterprise services



Lightweight MQ for Mobile Messaging (MQTT)



MQTT - (MQ Telemetry Transport) clients augment Worklight capabilities:

- Reliable messaging that conserves battery power and reduces network traffic
- Clients are linked into the app by the app developer

Worklight Server provides security, app management, statistics gathering etc.s

APNS - Apple Push Notification Service
GCM - Google Push Notification

Java Script Object Notation (JSON)
- Lightweight Web Services

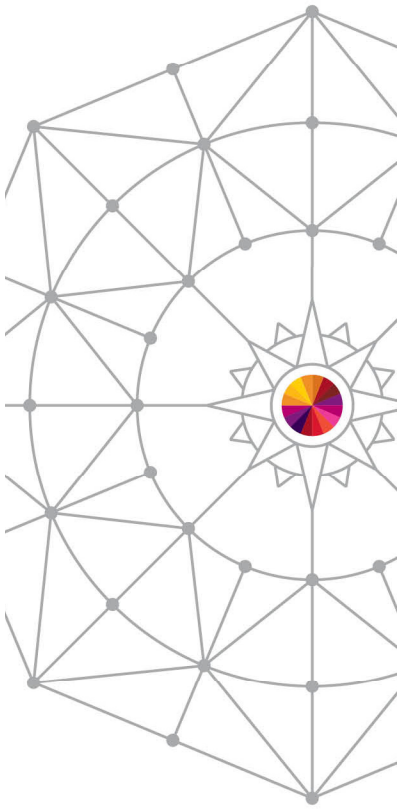
- The growth in mobile helped boost the popularity of JSON
- The lightweight data format is ideally suited to mobile data transfer
- As a result numerous tools and frameworks now support JSON…

IBM Worklight uses JSON:
- For communication between a mobile application and the Worklight Server
- Provides a JSON Store for offline storage of data
- Automatically converts Webservice SOAP replies into JSON

Numerous other frameworks depend upon JSON data…

Eg. jQuery & dojo use JSON:
- JSON Store
- Ajax calls
- All data interchange

CICS Transaction Server Feature Pack for Mobile Extensions V1.0

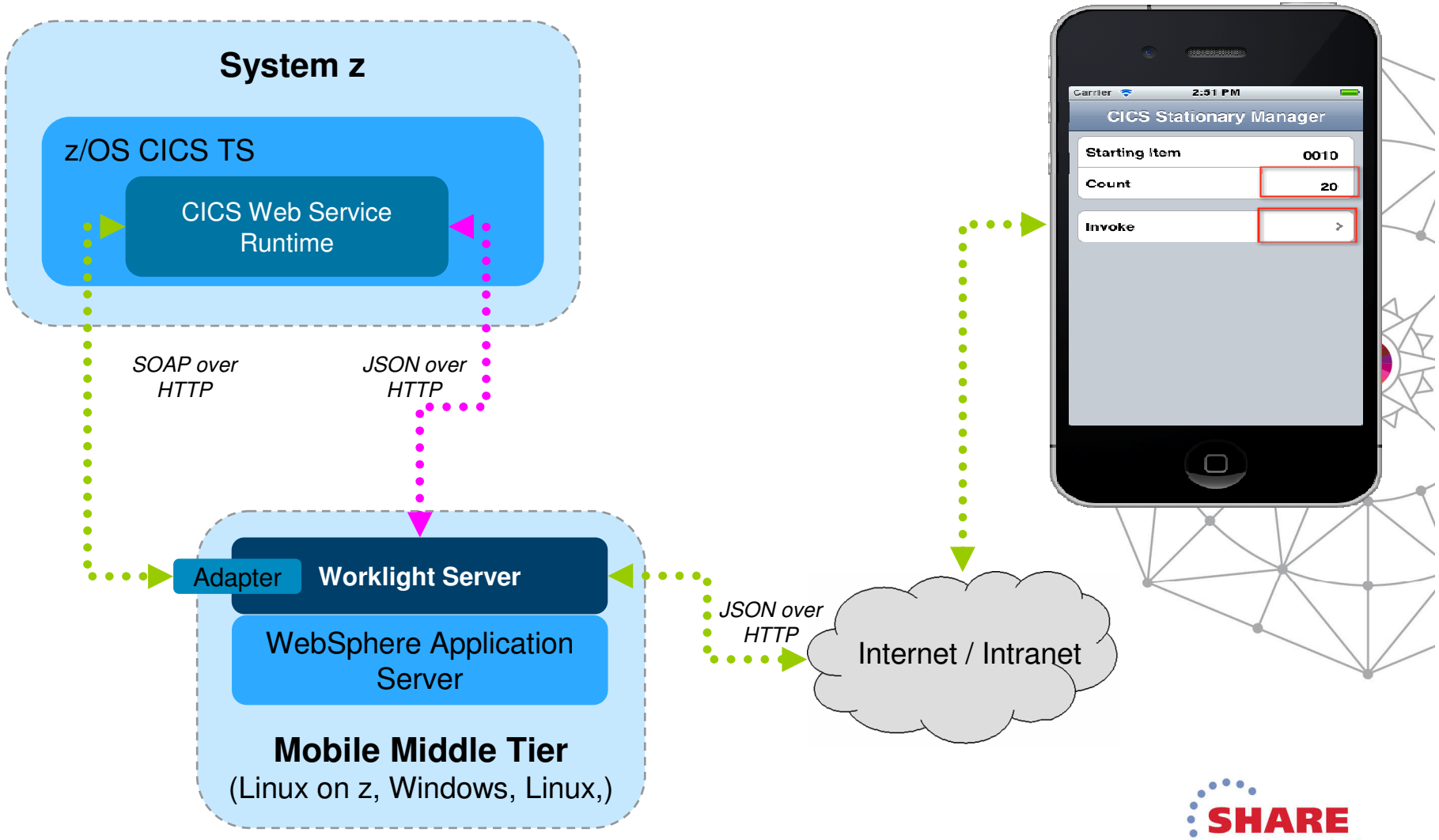


The CICS TS Feature Pack for Mobile Extensions V1.0 enables you to extend the reach of your existing COBOL, C/C++, and PL/I programs to mobile devices, without having to make costly changes to your applications. The feature pack adds support for web service requests using JavaScript Object Notation (JSON) and the conversion between JSON and high-level language data structures, creating an efficient method of consuming enterprise data on a mobile device.

- Ideal for companies that wish to build mobile applications to exploit existing enterprise services hosted within the robust and scalable CICS environment
- Uses existing CICS web service technology: a separate WSBIND file provides the mapping from the COBOL, C/C++, or PL/I language structures to JSON, or from JSON back to the language structure
- Requests are process by CICS in a web service pipeline, taking advantage of the proven web service infrastructure within CICS Transaction Server
- JSON greatly simplifies connectivity to mobile devices, particularly when using IBM Worklight Server, as you no longer need to write extensive custom adapter code to invoke CICS services

The CICS TS Feature Pack for Mobile Extensions V1.0 is available for CICS TS V4.2 and CICS TS V5.1

CICS TS – Easier Communication via JSON (JavaScript Object Notation)



JSON access to CICS via REST APi

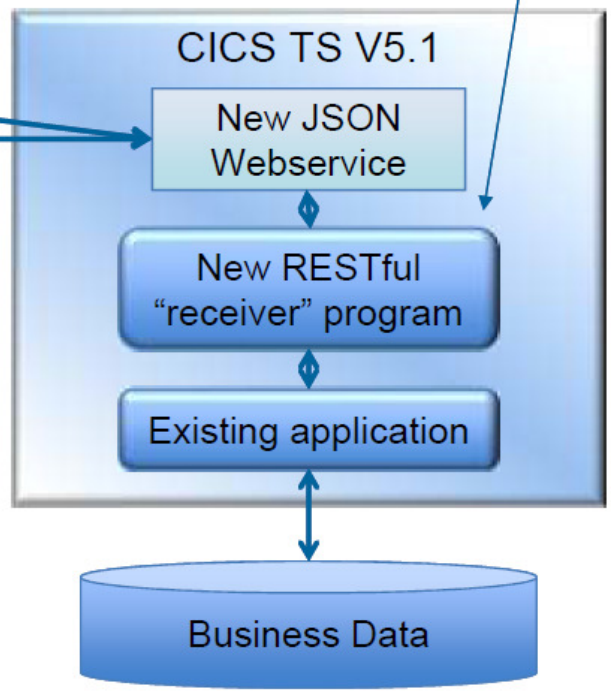
Connect a mobile application to CICS using the RESTful JSON interface

Wrapper application in CICS uses the URL to identify the resource, DB or VSAM File, with the Path being the specific element to operate on

App. makes a RESTful call, using HTTP GET (read) or POST (write) to a named resource

WSBIND

Use DFHJS2LS to generate a language structure corresponding to the **inbound JSON** schema the CICS application will receive.



JSON access to CICS via Worklight

Exposing an existing CICS application as a JSON callable service

Existing SOAP Webservices remain unaffected by the introduction of new mobile based clients.

Worklight

CICS TS V5.1

Existing SOAP Webservice

New JSON Webservice

WSBIND

Existing application

Business Data

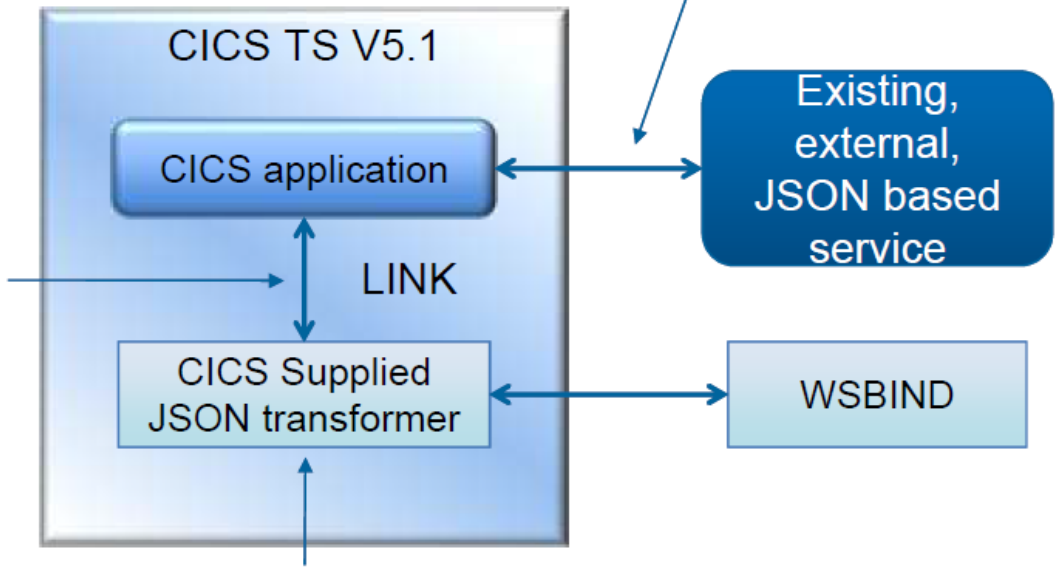
Use DFHLS2JS to generate a JSON Schema corresponding to the language structure of the existing CICS application.

CICS Pipeline processing converts the request into the correct format

JSON service call from CICS

A CICS application wants to convert data into JSON format to call an external service

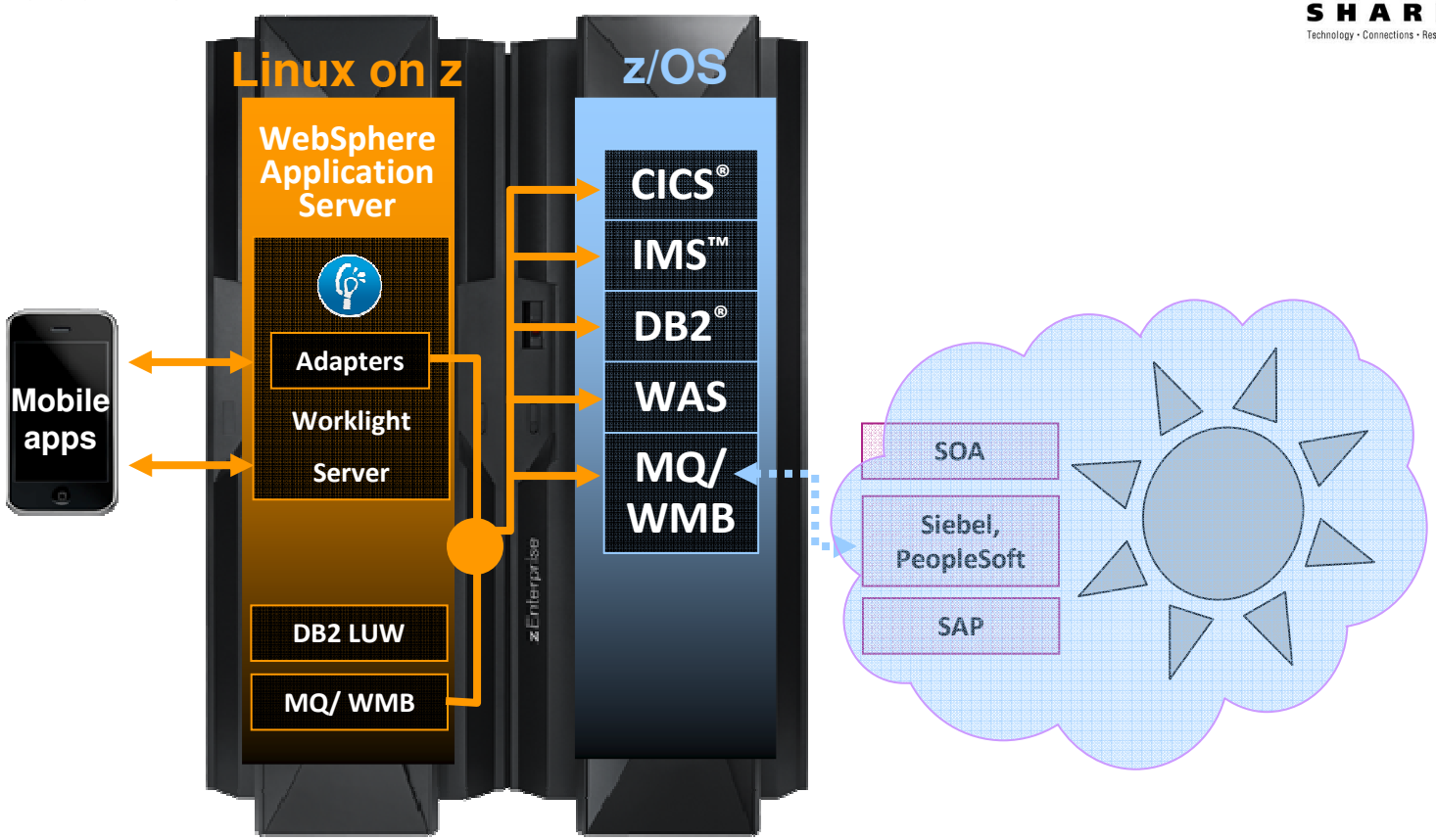
Use a EXEC CICS WEB OPEN call to invoke the target external service passing the transformed JSON data



Analogous to using the **XML Transform API**, the CICS application LINKs to the JSON transformer to convert binary data into the desired JSON format

The JSON transformer works both ways…
Pass in **JSON to** generate **binary** data.
Pass in **binary** data **to** generate **JSON** data.

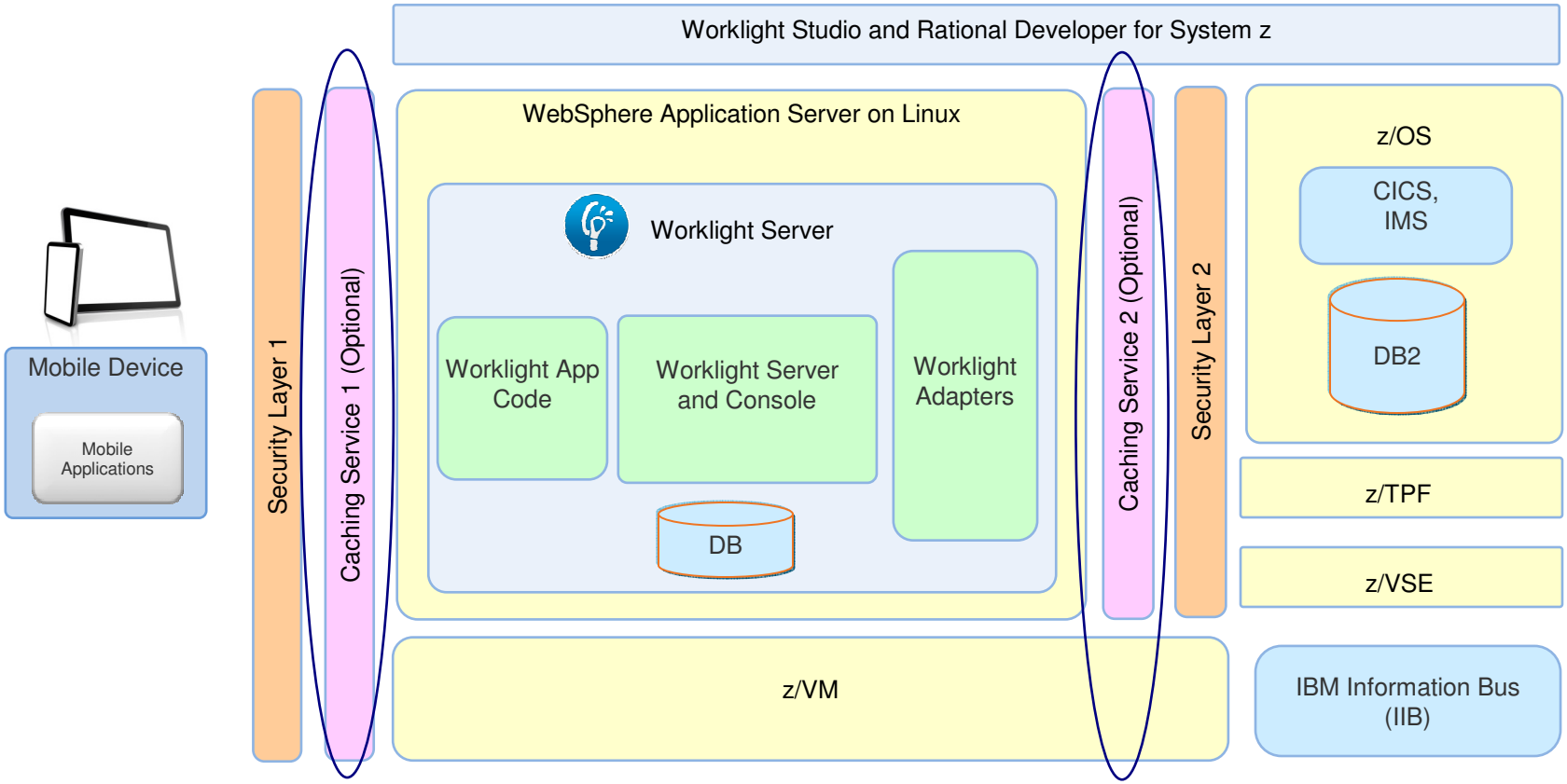
Mobile Environment on zEnterprise connecting to Core Systems



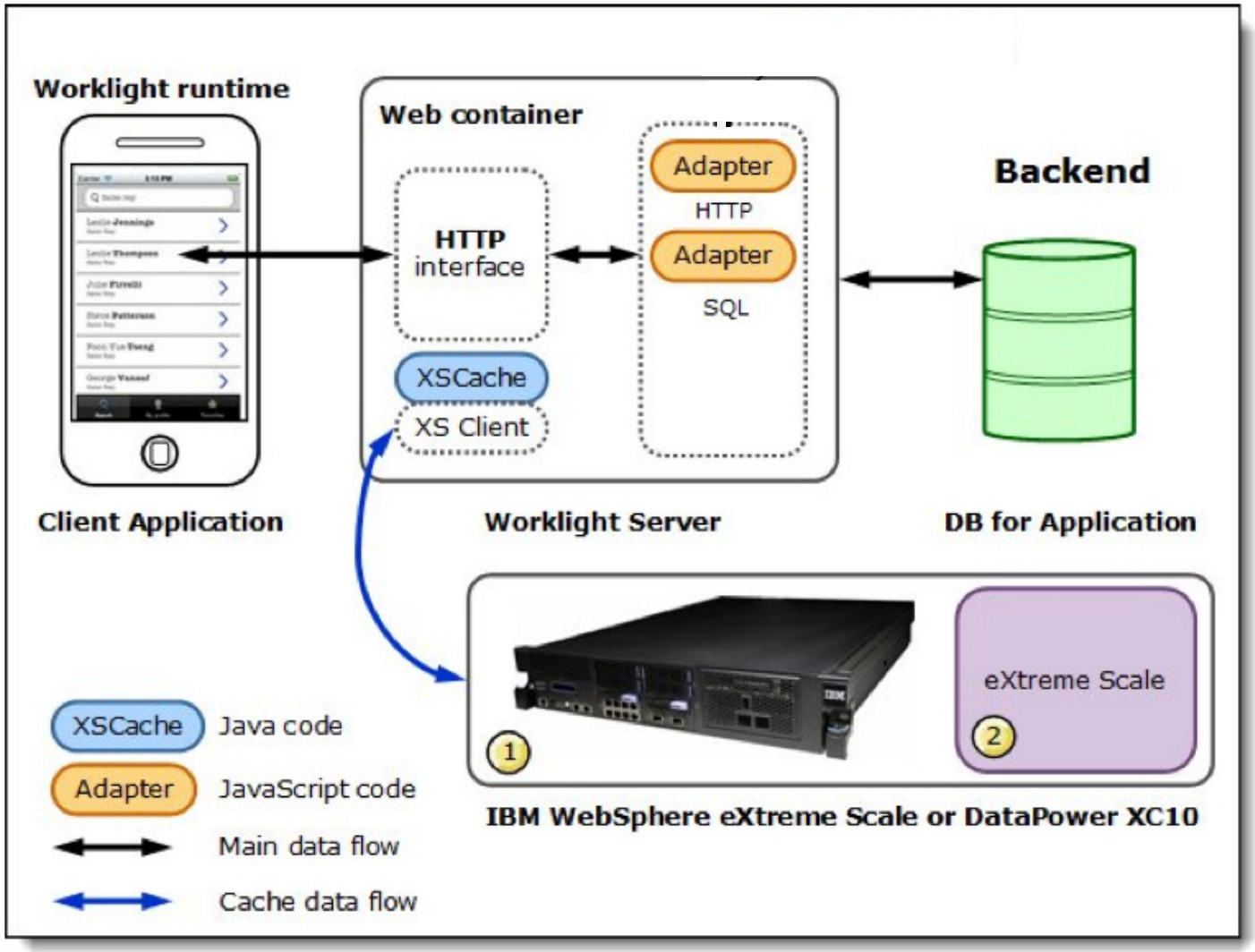
IBM zEnterprise®

- **Server side software components and adapters for channeling System z to mobile devices** with IBM Worklight Server
- **Mobile application support** with WebSphere Application Server on System z
- **Mobile protocol connectivity with core System z applications** including CICS, IMS, TPF, MQ, WMB and DB2

Mobile Architecture Overview for System z

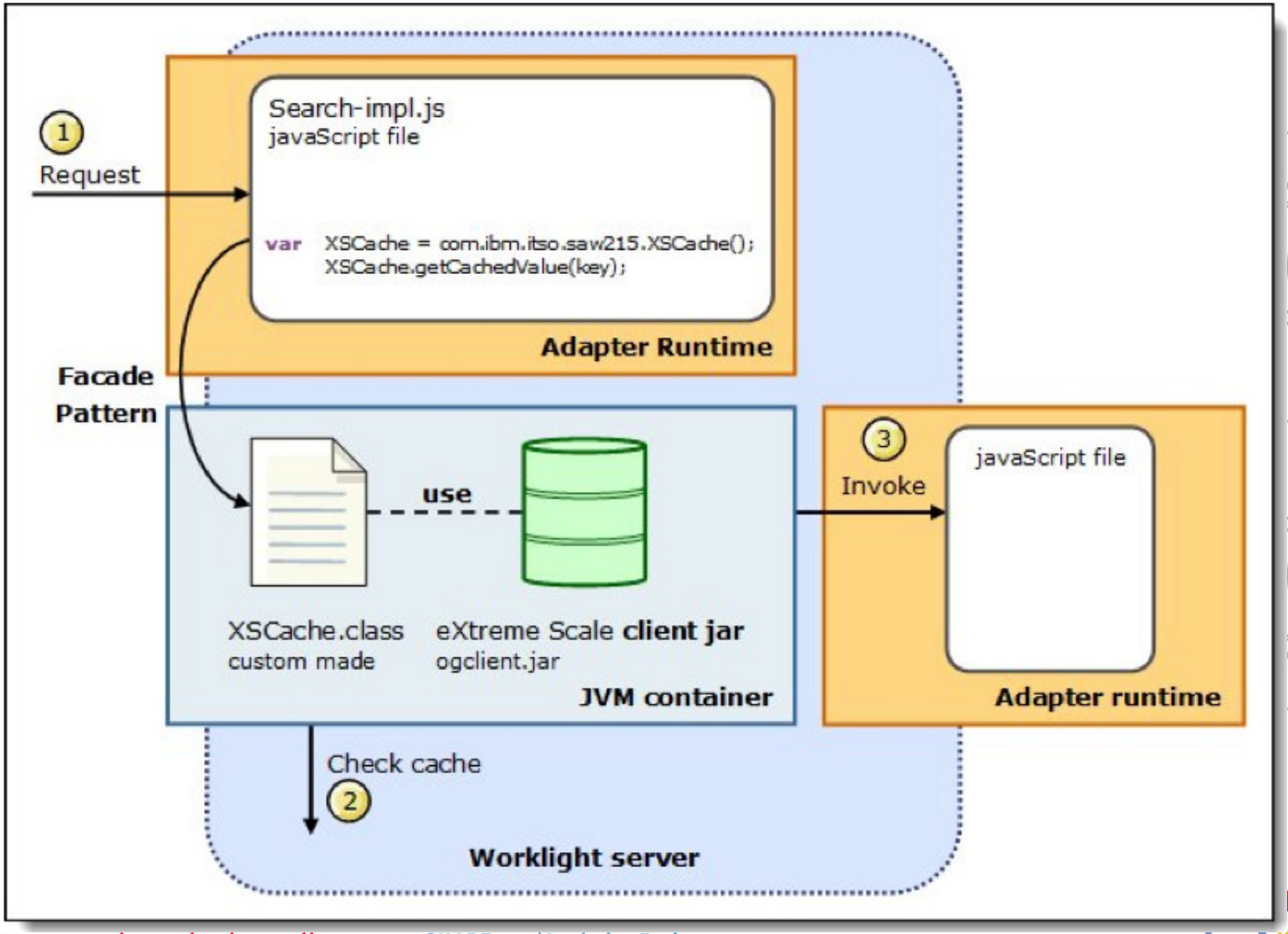


Worklight caching



Solution Architecture from: http://www.redbooks.ibm.com/abstracts/tips0953.html#contents

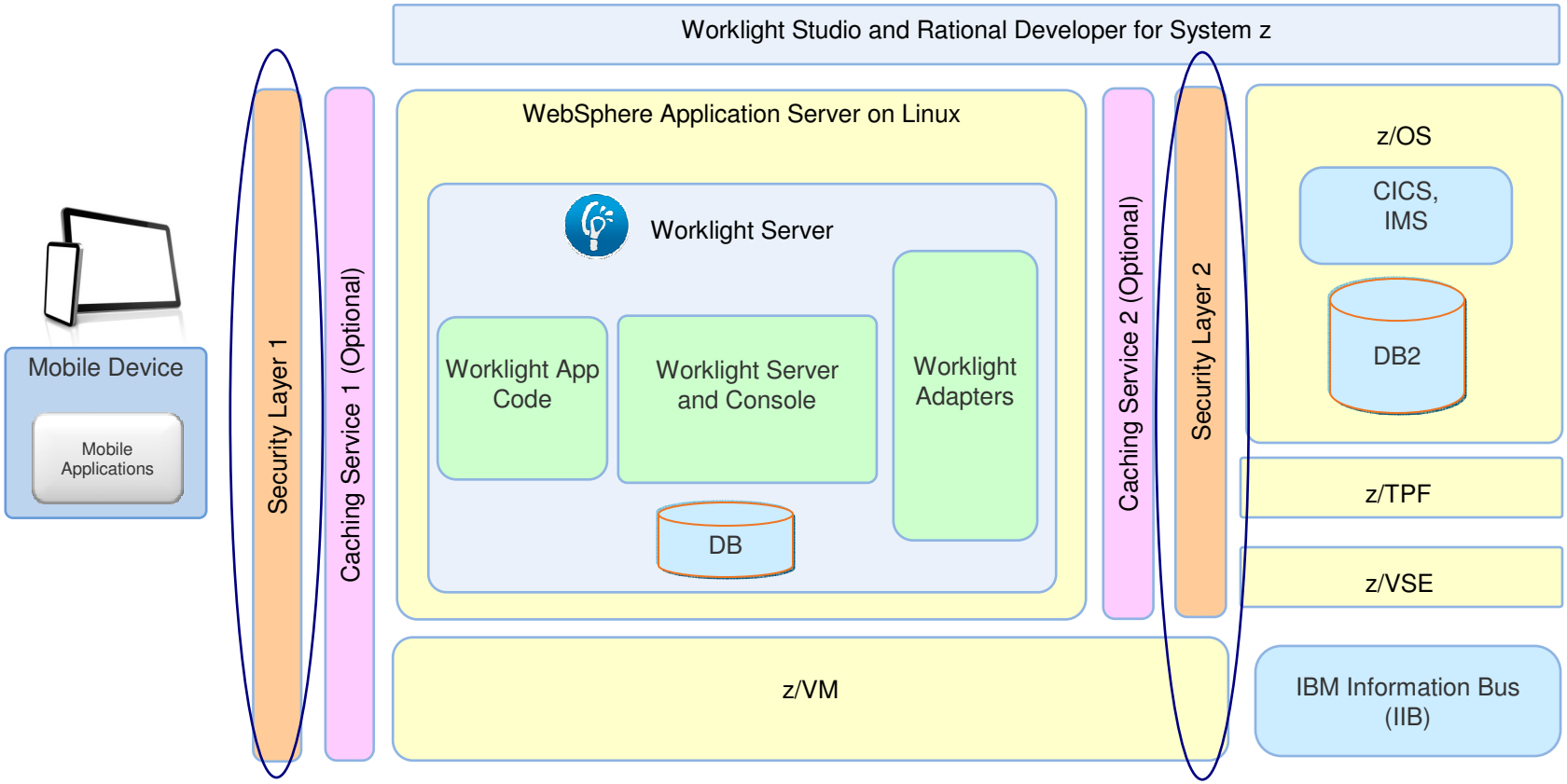
Worklight Adapter integration with WebSphere Extreme Scale



Caching solution decision

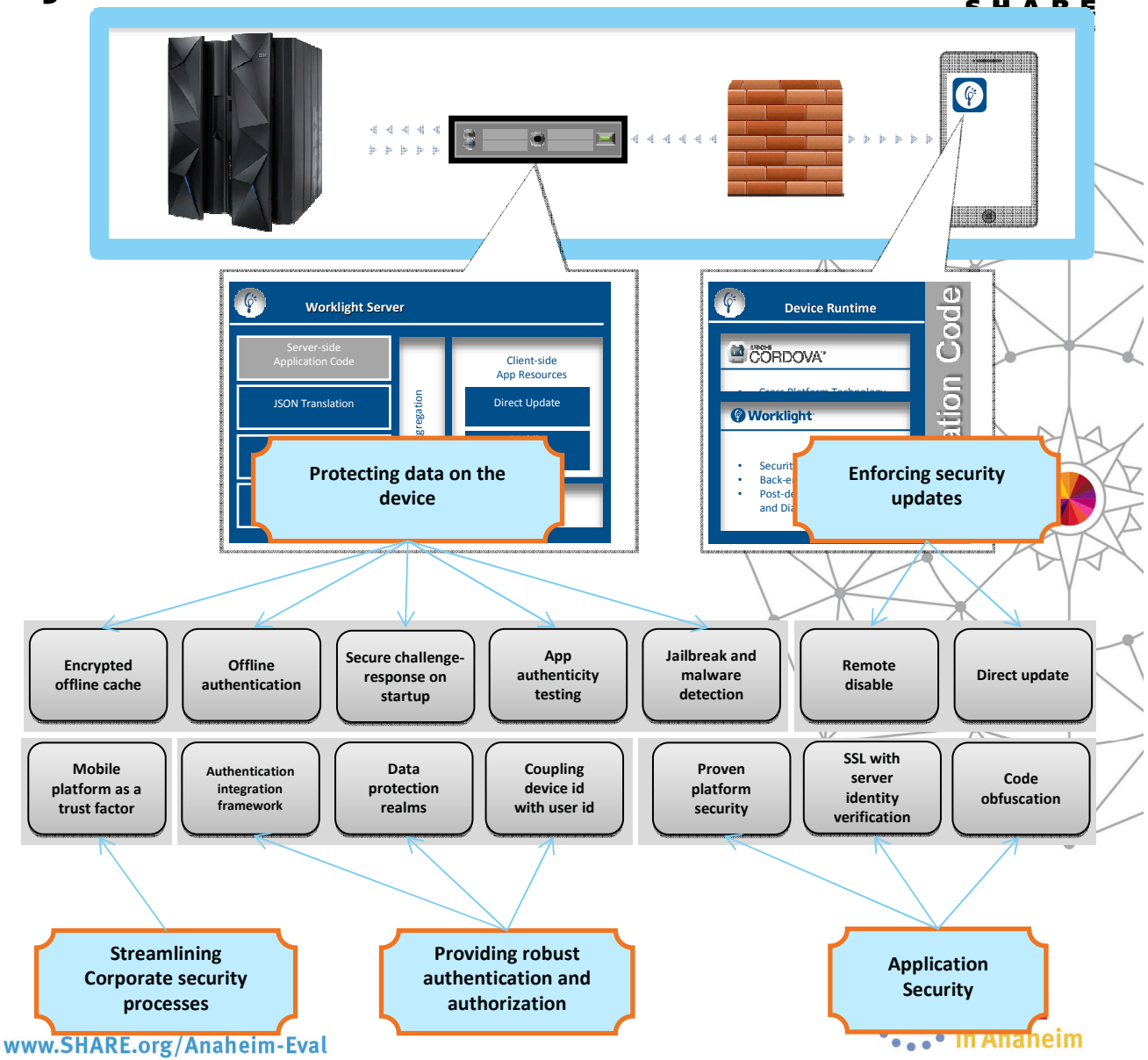
Options for caching	Rationale and decision points
When use WebSphere Extreme Scale (WXS)?	WXS is a general-purpose scalable cache. It can be added to any java application running in the mid-tier without requiring changes to any transactions running in the back-end. JavaScript code has to be implemented in the mobile application source to take full benefit of WXS.
When use DataPower XC10 appliance?	Out-of-the box caching appliance that can deliver benefits without adaption of (mobile) application needed. Just configure the network topology to point to the XC10 Typically placed in DMZ to cache static data.
Why use front end caching?	In cases where static data like images, user profiles, product description and HTML are to be cached. Front end caching makes it possible to cache a large set of data, for all requests for (back end) services are processed here. Performance improvement tends to be more of an entry point.
Why use back end caching?	Typically to off-load back end queries in cases where inquiries are made but no business relevant transactions are performed.

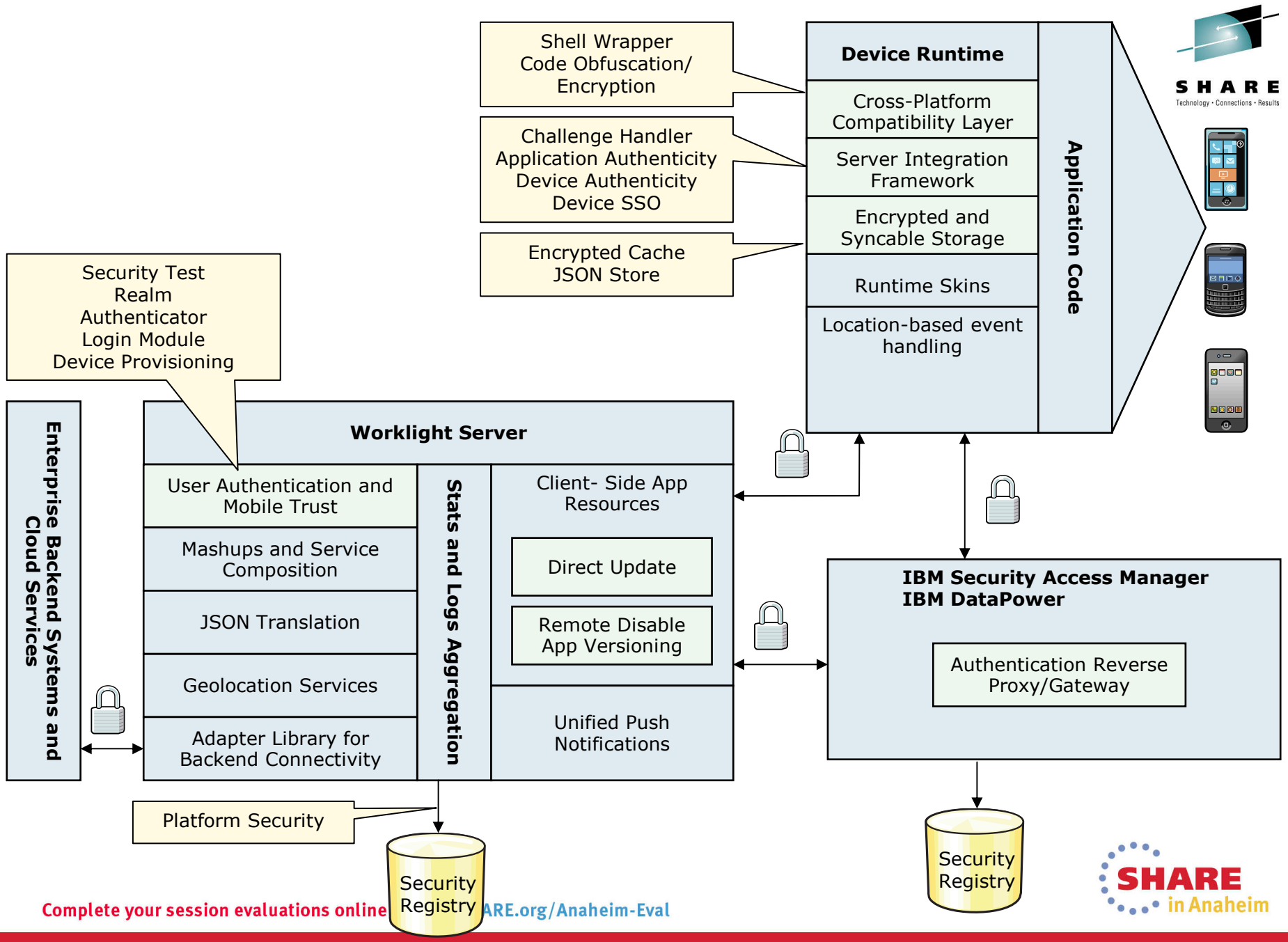
Mobile Architecture Overview for System z



Worklight Security Features

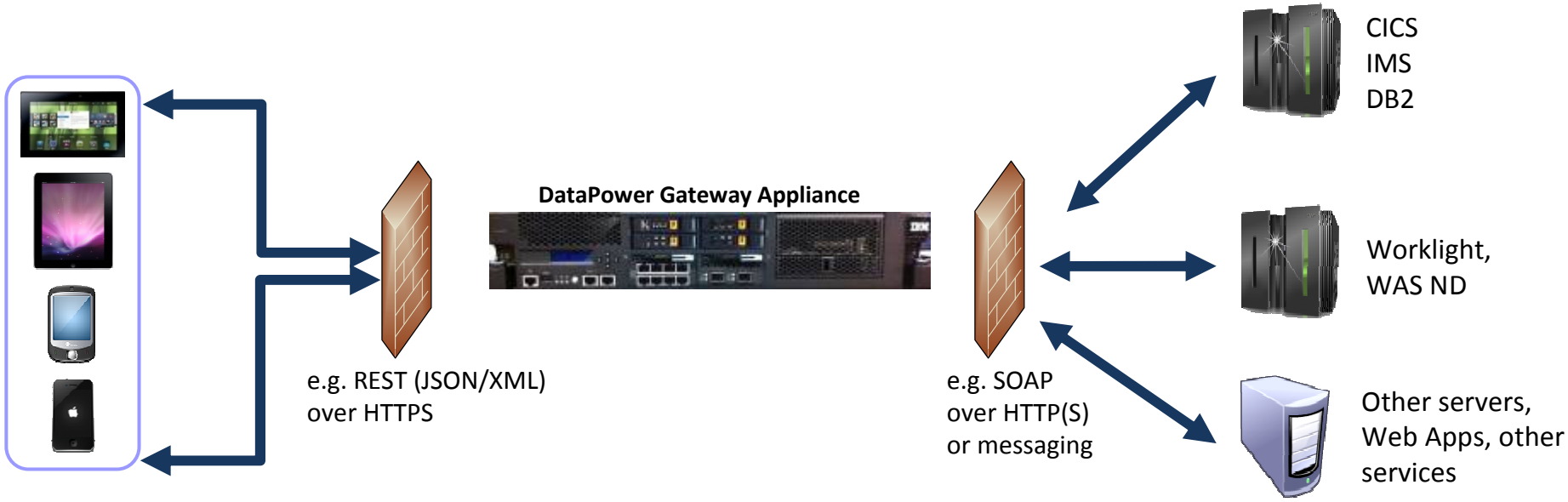
- Ensure that only specific applications on specific devices can connect to enterprise systems
- Extensible framework for authentication of mobile application users
- Encrypt data on the device
- Enforce security updates
- Propagate identity to enterprise systems




Shell Wrapper
Code Obfuscation/
Encryption
Challenge Handler
Application Authenticity
Device Authenticity
Device SSO
Encrypted Cache
JSON Store
Device Runtime
Cross-Platform
Compatibility Layer
Server Integration
Framework
Encrypted and
Syncable Storage
Runtime Skins
Location-based event
handling
Application Code
Security Test
Realm
Authenticator
Login Module
Device Provisioning
Enterprise Backend Systems and
Cloud Services
Worklight Server
User Authentication and
Mobile Trust
Mashups and Service
Composition
JSON Translation
Geolocation Services
Adapter Library for
Backend Connectivity
Stats and Logs Aggregation
Client- Side App
Resources
Direct Update
Remote Disable
App Versioning
Unified Push
Notifications
IBM Security Access Manager
IBM DataPower
Authentication Reverse
Proxy/Gateway
Platform Security
Security
Registry
Security
Registry
SHARE
Technology • Connections • Results
SHARE
in Anaheim

DataPower Mobile Security Features

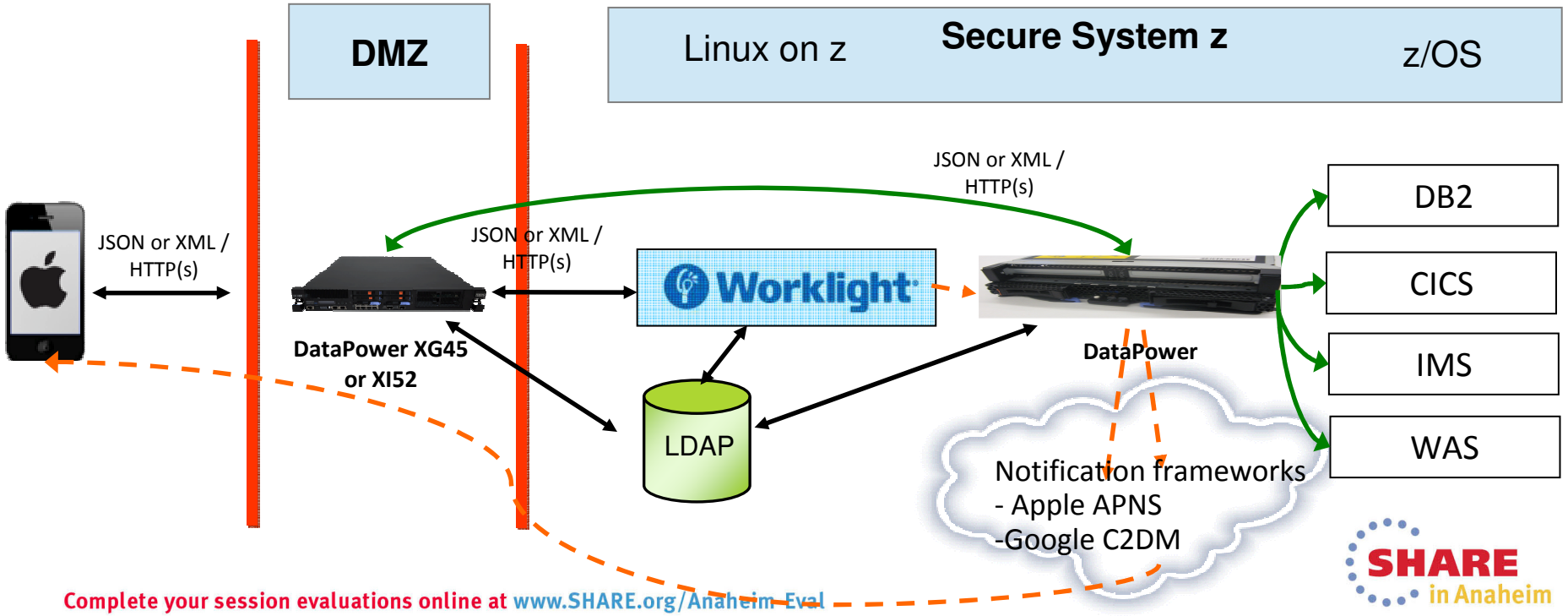
Available as a physical or virtual appliance



- Security, Control, Integration & Optimization of mobile workload
- Enforcement point for centralized security policies
- Authentication, Authorization, SAML, OAuth 2.0, Audit
- Threat protection for XML and JSON
- Message validation and filtering
- Centralized management and monitoring point
- Traffic control / Rate limiting
- Integration with Worklight

Security Topology – DataPower as a 2nd security layer

Capabilities	Deployment scenarios	System z benefits
• DataPower contains the same functionality as a stand-alone device or virtual appliance, but can benefit from co-location with System z services. • Defence in depth	• For offload of security processing (e.g SSL) and to perform identity mapping • Secure proxy for push notifications from Worklight server to the mobile device	• DataPower acts as an additional security layer for backend services • IEDN provides a secure private network for communication between zLinux and z/OS



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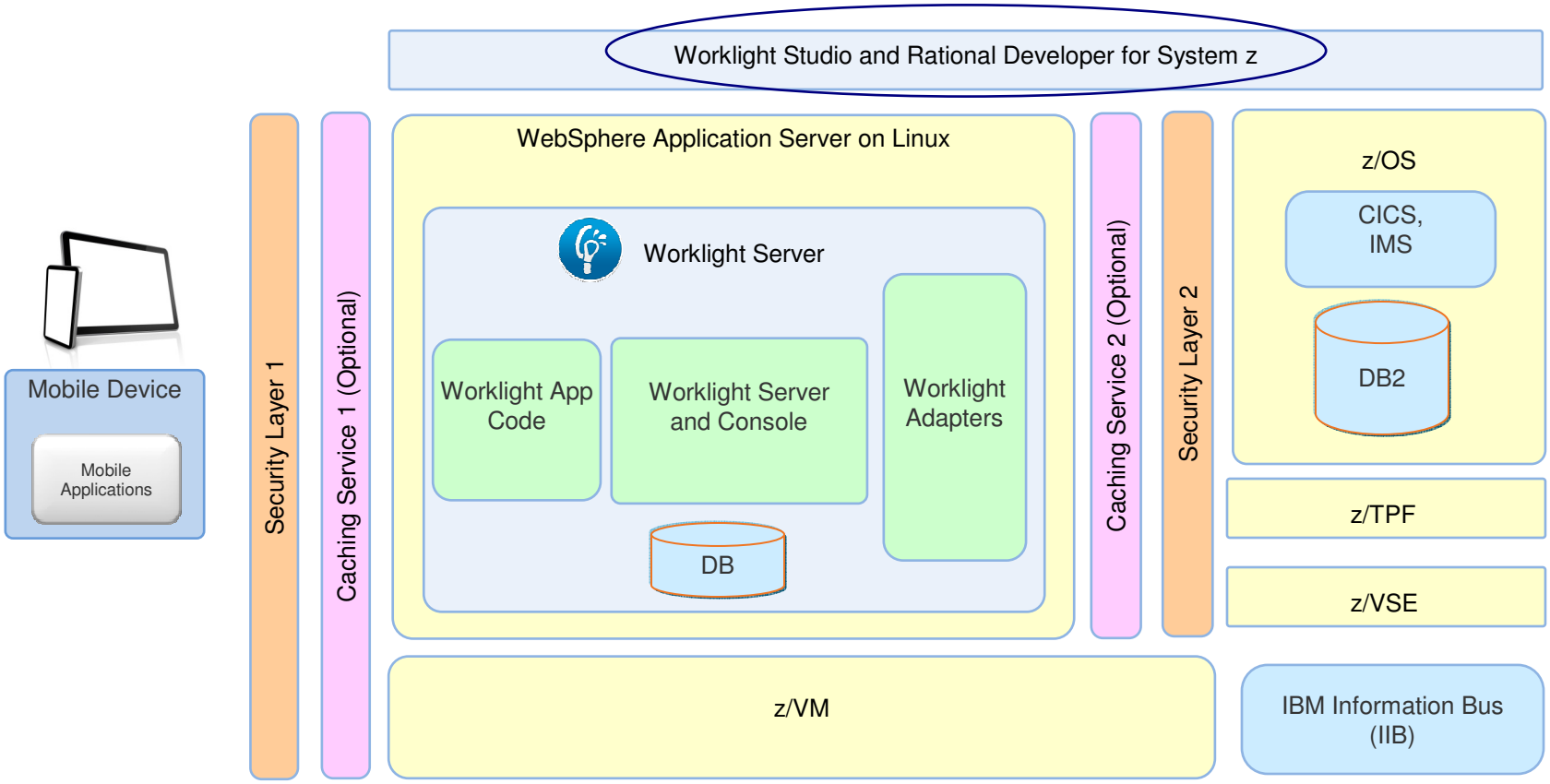
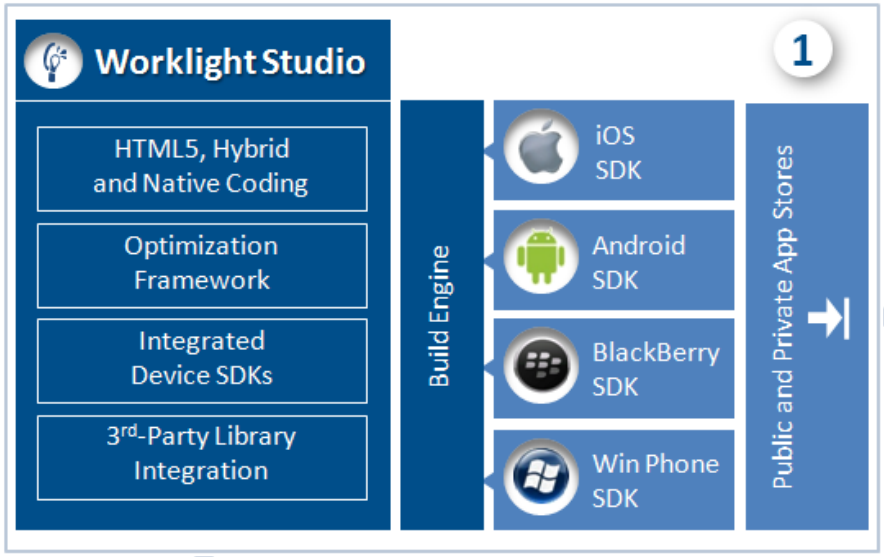
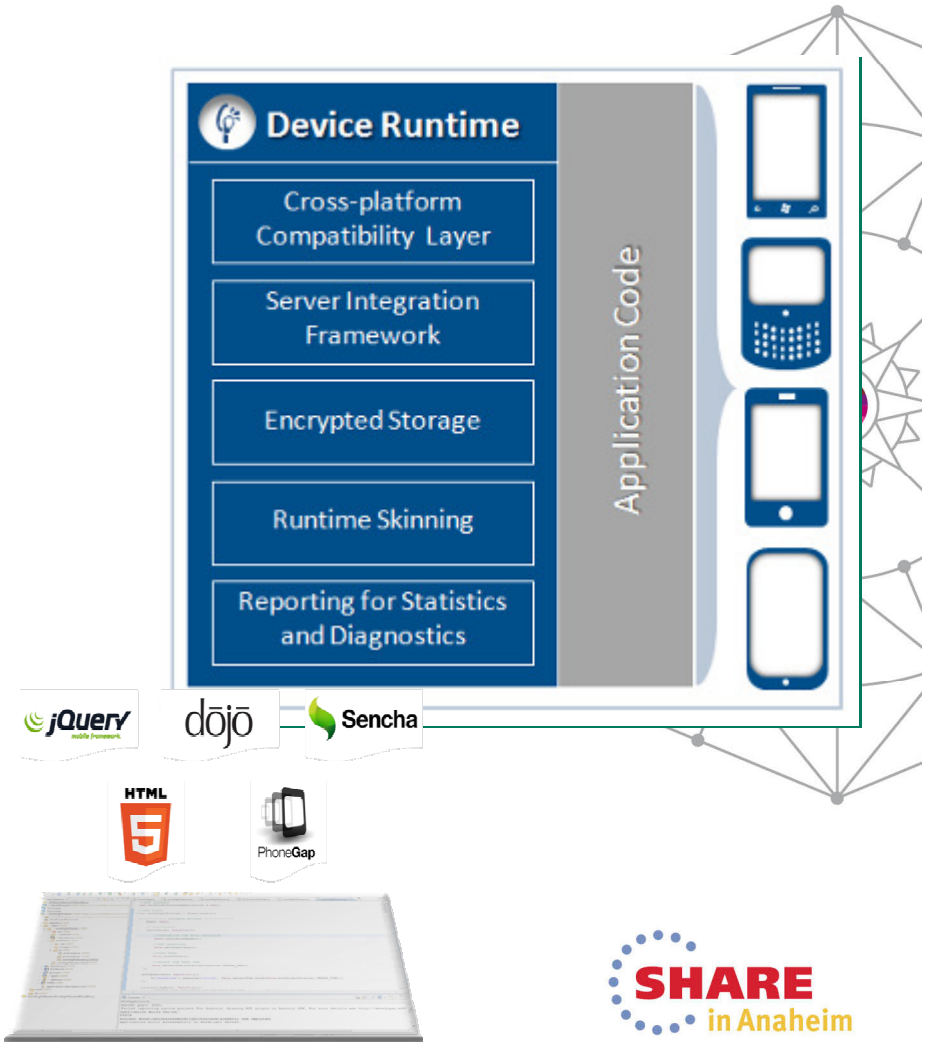


IBM Worklight Studio & Device Runtime



Eclipse based mobile **Integrated Development Environment (IDE)**



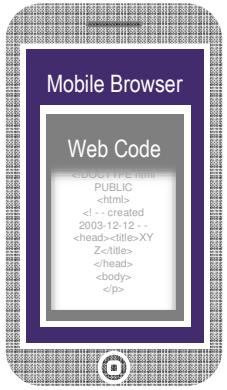
IBM Worklight – Support for Different Mobile Application Styles

•Simplifies the development of mobile applications across multiple mobile platforms - iOS, Android, BlackBerry, and Windows® Phone

Worklight
The Foundation for Mobile

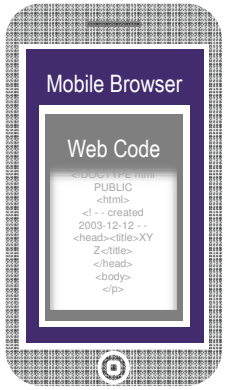
Web

- HTML, JavaScript, CSS
- Accessed from a mobile web browser
- No device-specific capabilities



Mobile Web

- HTML, JavaScript, CSS
- Accessed from a mobile web browser; mobile-optimized UI
- Limited access to lower-level device capabilities

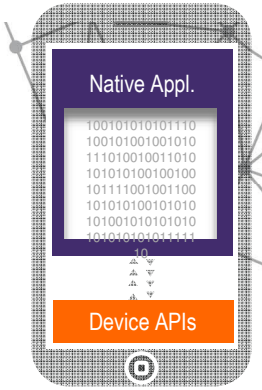


Hybrid Mobile

- HTML, JavaScript, CSS, with optional native code
- Installed and run like a native mobile app; mobile-optimized UI
- Access to lower-level device capabilities

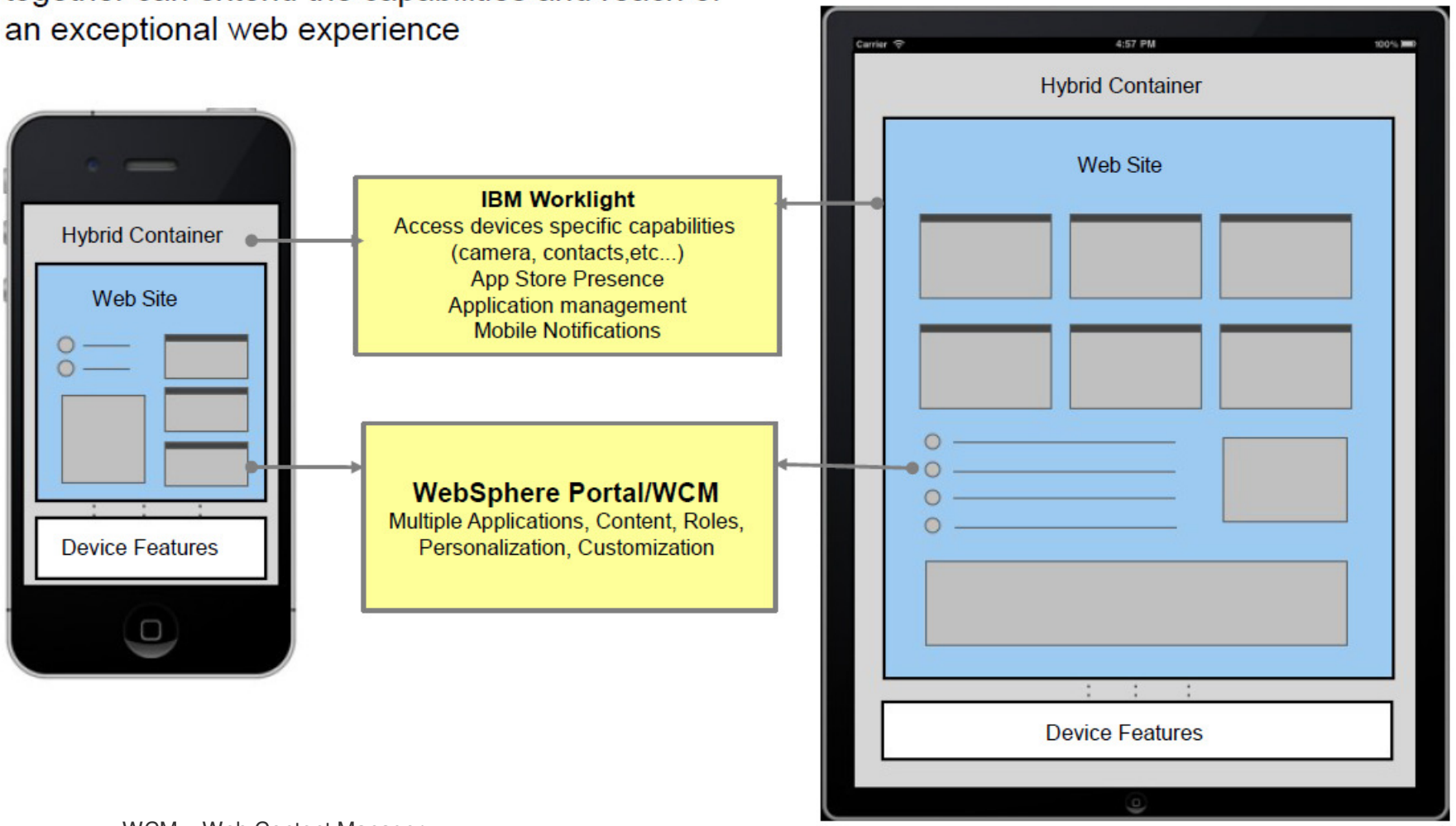
Native

- Native code
- Access to full set of lower-level device capabilities



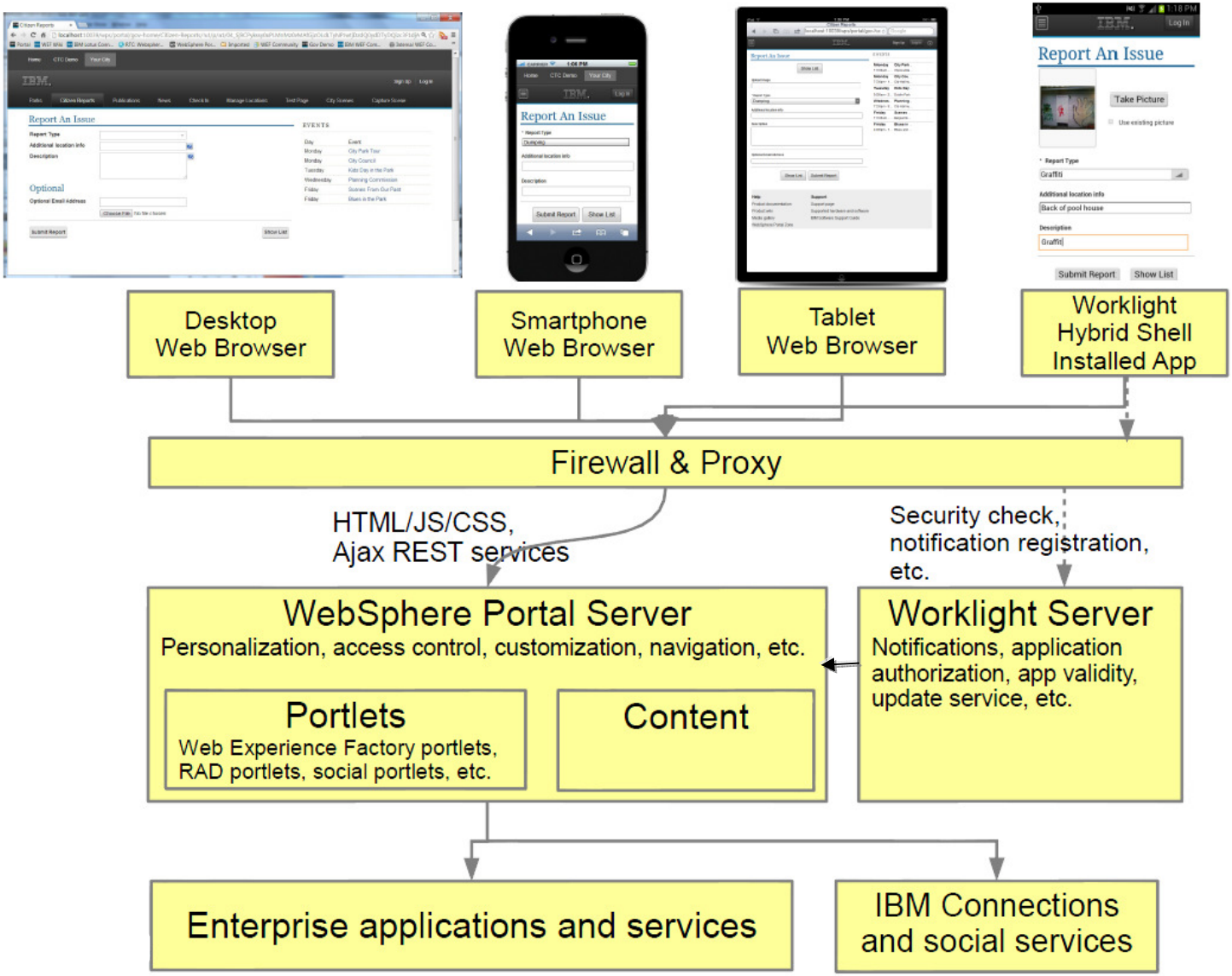
Hybrid – Worklight and WebSphere Portal together

WebSphere Portal/WCM and IBM Worklight used together can extend the capabilities and reach of an exceptional web experience



WCM = Web Content Manager

Multi-channel site – with WebSphere Portal and Worklight



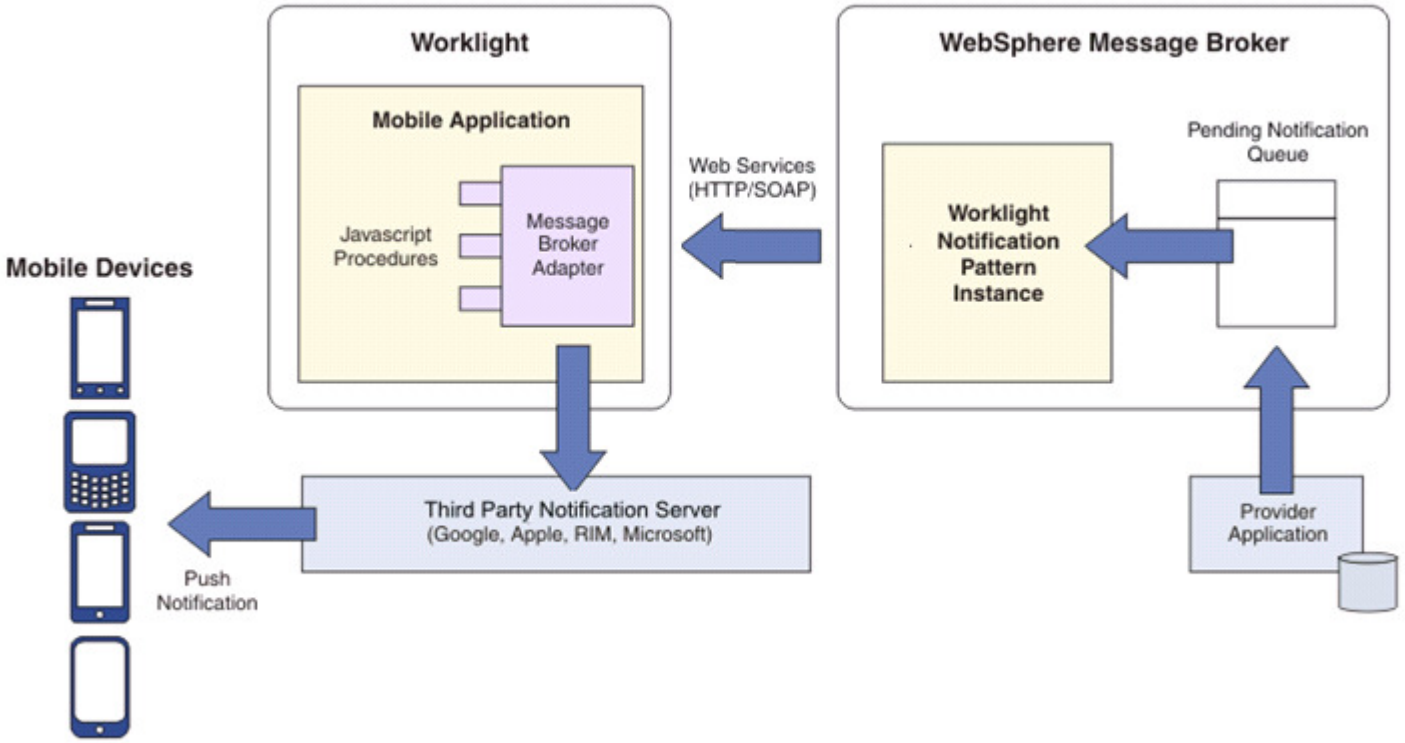
Apps on Mobile devices:
- with WPS Web Sites
- with apps from WL
- with hybrid content from WPS through WL

Worklight Push Notification Services

- Users receive notifications when the mobile application is not active
  - Efficiency gain as application does not need to issue constant queries
  - Saves battery life and also reduces network bandwidth (communication fees)
- Notifications are not always appropriate and have disadvantages
  - Users need to subscribe on their device to receive push notifications
  - Notifications are limited in the size of their payload (for example, 256 bytes on iOS)
  - No quality of service is guaranteed and there is no delivery notification
  - No guarantee either that the end-to-end delivery chain is secure

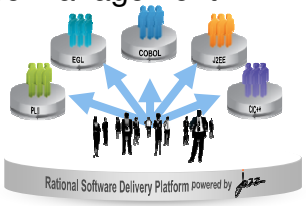
Worklight Push Notification from WebSphere MQ

- Creates a push notification adapter from a WebSphere MQ queue
  - Generates a web service implementation which is deployed to Message Broker
  - Builds a Worklight integration adapter which polls for pending notifications
  - Pending notifications are written to a WebSphere MQ queue by a provider application
  - The adapter converts the notifications into JSON and arranges delivery to the mobile

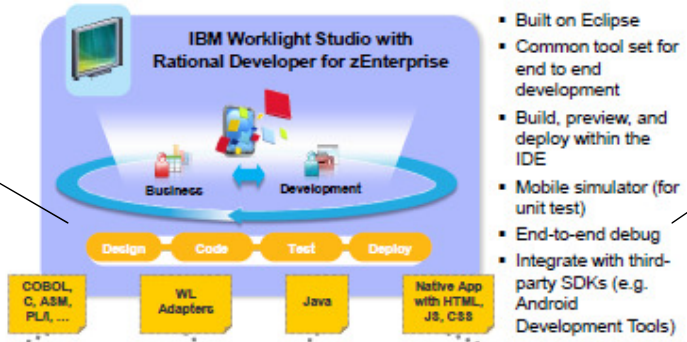


Worklight Studio with RDz a complete set of System z and Mobile Development capabilities

Integration with Team Concert for Lifecycle and Source Management



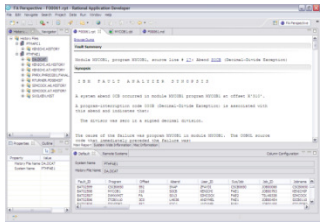
Access to typical System z sub-system functionality in z/OS, CICS, IMS, DB2, WAS



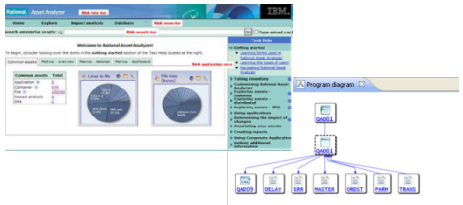
Integration with RD&T for flexible access to System z environment

Robust Mobile Development in conjunction with Worklight

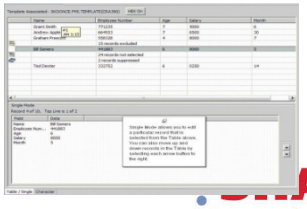
Integration with Fault Analyzer for Dump Analysis



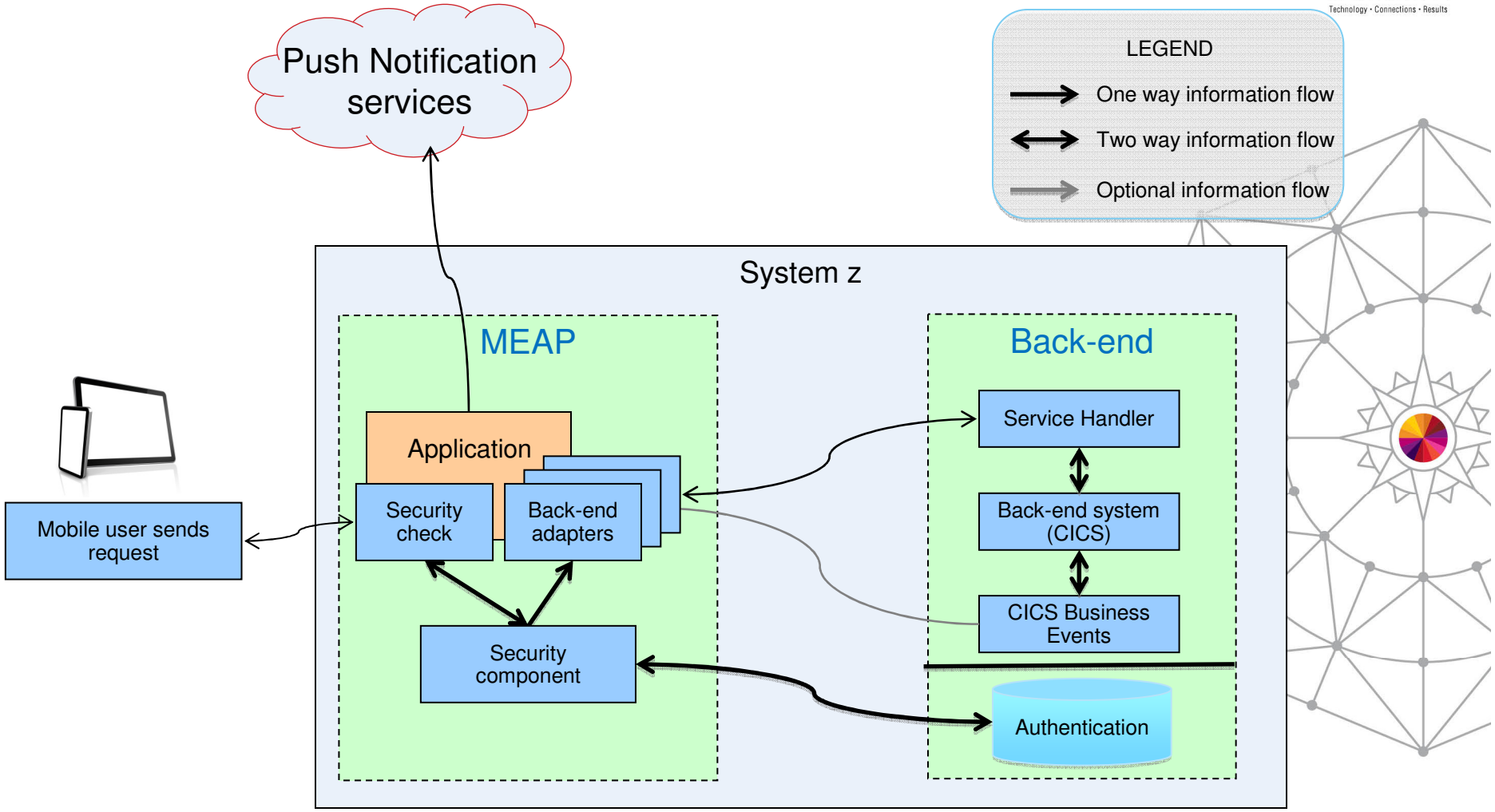
Integration with Asset Analyzer for Application Understanding and Impact Analysis



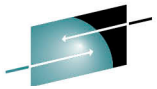
Integration with File Manager and Fault Analyzer for file and test data handling and Dump Analysis



Operational setup



Environment Setup



Make use of developerworks documents:
http://www.ibm.com/developerworks/mobile/worklight/getting-started.html#basics

- **Install IBM Installation Manager**
- **Install a web application server**
  - **WAS Liberty 8.5.5 or WAS Full Profile 8.5 or WAS ND**
- **Install a database for Worklight**
  - **DB2 LUW or Oracle**
- **Install IBM Worklight server**
- **For development, install on a workstation or Apple laptop:**
- Eclipse Keppler or Eclipse Juno 4.22
  - Worklight Studio – will be installed via the Eclipse update/plugin function
  - **you get a development environment with a full worklight server included**
  - **Download the development environment from:**
    https://marketplace.eclipse.org/content/ibm-worklight-developer-edition

Application server memory sizing for Worklight

The Worklight Server can utilize different Application Servers like Apache Tomcat, WebSphere Application Server (WAS) in different flavors WAS Liberty profile, WAS Full Profile, or WAS ND.

IBM Worklight server must be installed on a 64-bit operating system with all software at 64 bit.

JVM memory allocation

- Set the JVM to have at least 2GB memory
- For a production environment, it is recommended, setting the minimum and maximum heap size to the same value to avoid heap expansion and contraction.

Where to set application server configuration:

- ***Apache Tomcat***:

Find the Catalina script and set JAVA_OPTS to inject memory.

- ***WebSphere Application Server:***

Log in to the admin console. Go to Servers > Server types > WebSphere application servers: choose each server and set Java memory settings under Java Process definition > JVM arguments

- ***WebSphere Liberty***

Adoptions have to be made in profile jvm.options

Consult:

http://pic.dhe.ibm.com/infocenter/wasinfo/v8r5/index.jsp?topic=%2Fcom.ibm.websphere.wlp.core.doc%2Fae%2Ftwlp_admin_customvars.html

For general guidelines for JVM Memory allocations, you can use the hardware calculator at
http://www.ibm.com/developerworks/mobile/worklight/getting-started.html

Application server thread thresholds

Execution thread behavior

- Each incoming request requires a thread for the duration of that request.
  - Depending on workload or connection type this varies
- Simultaneous requests are handled by the currently available request processing threads
  - Additional threads will be created up to the configured maximum.

Application server configuration:

- **Apache Tomcat:**
  - By default the maximum number of threads is 200.
  - For details consult: http://tomcat.apache.org/tomcat-7.0-doc/config/http.html

- **WebSphere Application Server:**
  - By default the maximum number of threads is 50.
  - Verify via admin console. (Go to Servers > Server types > WebSphere application servers > server_name > Web container)

- **Liberty see executer section in:**
  - By default the maximum number of threads is unbounded.
  - For Details see: http://pic.dhe.ibm.com/infocenter/wasinfo/v8r5/index.jsp?topic=%2Fcom.ibm.websphere.wlp.nd.multiplatform.doc%2Fautodita%2Frwlp_metatype_4ic.html
  - even though the maximum number of threads is theoretically unbounded, the executor service makes informed choices about whether adding another thread will actually be useful.

There are several considerations when setting http threads configuration:

- Analyze request behaviors.
  - if the longest call takes 500 ms and you have maximum of 50 threads, you can have about 100 requests per second.
- Back-end connection behavior influences thread execution
  - For slow back-end services you will need to increase the number of default threads.
  - In addition increase the number of back-end connection threads (set maxConcurrentConnectionsPerNode as shown below).
- For high number of concurrent users, increase the number of default threads

Tuning Worklight database connections

- Configure in the data source, the number of connection threads from the server to its database.
- Two Worklight features rely heavily on the Database connection threads
  - Single Sign On (SSO)
  - Reporting Feature

Limitations

- Each node in Worklight server cluster has max of
  - MAX_DB_INCOMING_CONNECTIONS & NUM_OF_CLUSTER_NODES connection threads
    - MAX_DB_INCOMING_CONNECTIONS is the maximum incoming connections defined in the database server
    - NUM_OF_CLUSTER_NODES represents the number of Worklight server nodes in the cluster

As rule of thumb, set the number of database connections equally with the number of http threads in the application server

***Data source* configuration in application servers:**

- **For WebSphere Application Server see:**
  - http://pic.dhe.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=%2Fcom.ibm.websphere.nd.multiplatform.doc%2Finfo%2Fae%2Fae%2Fudat_conpoolset.html
- **For WebSphere Liberty see datasource section in:**
  - http://publib.boulder.ibm.com/infocenter/radhelp/v8r5/index.jsp?topic=%2Fcom.ibm.websphere.wlp.nd.multiplatform.doc%2Fautodita%2Frwlp_metatype_4ic.html
- **Apache Tomcat:**
  - http://tomcat.apache.org/tomcat-7.0-doc/jndi-datasource-examples-howto.html

Back-end connection tuning

Define the maximum number of concurrent requests from the Worklight server to the back-end services application node with:

maxConcurrentConnectionsPerNode – in the *adapter.xml* in the connectivity entry.

There are two considerations when setting this parameter:

- ***If no limitation in the back-end about the incoming connections***
  - set the number of connection threads per adapter to be the number of http threads in the application server
  - For more precise setting, set the number respectively to each back-end service (HTTP, SOA, Database service)

- ***The back-end with limitation on the incoming connection threads depend on:***
  - BACKEND_MAX_CONNECTIONS
  - NUM_OF_CLUSTER_NODES
    - BACKEND_MAX_CONNECTIONS is the maximum incoming connections define in the back-end server
    - NUM_OF_CLUSTER_NODES is the number of Worklight server nodes in the cluster

Worklight session timeouts

Mobile clients have a ‘heart beat‘which allows the mobile client to ping the server while the App is in the foreground so that the server session will not time out.

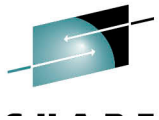
Also note that when a Mobile App is moved into the background, it no longer interacts with the server or sends a “heartbeat” leading the server session to stop after the specified server session timeout.

Parameter for session control:

- serverSessionTimeout – Client inactivity timeout, after which the session is invalidated.
  - Default session timeout is 10 minutes. The default can and should be configured.
    - It is recommended to set it from 3 to 10 minutes.
  - This parameter affects the server memory consumption.
  - A session is an object stored in the server memory for each connecting device (with its authentication information)
  - Active sessions are determined by the number of sessions opened vs. the sessions timing out due to lack of activity

- Example with 10 min session timeout: Suppose every minute 1,000 users start a session against the server. Even if they exit the application after 3 minutes, their session will remain active on the server for 10 minutes, leaving us with 10 x 1,000 = 10,000 sessions.

Worklight server background tasks

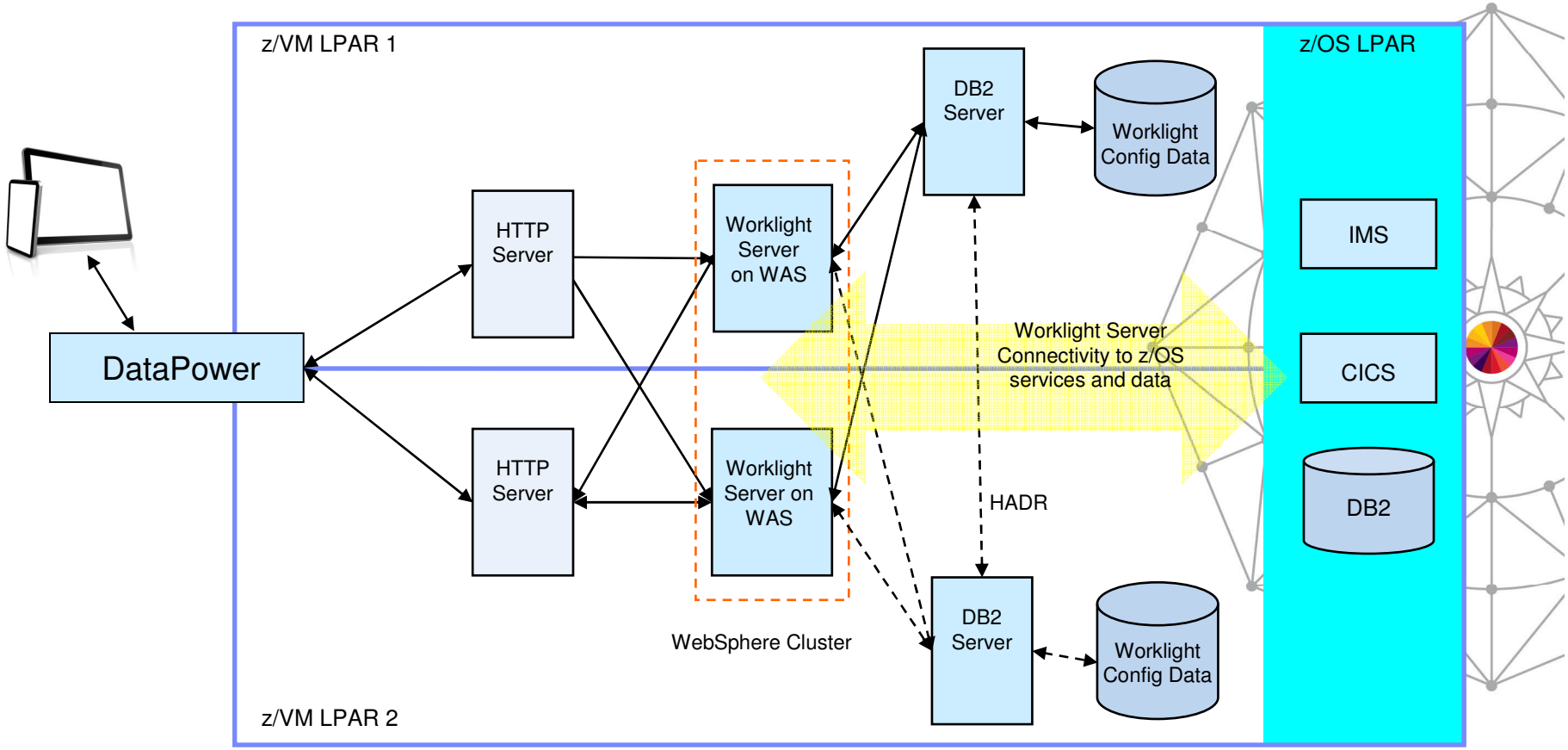


Worklight background tasks perform several actions on the database and/or file system. They can be controlled via parameters in worklight.properties file.

Important parameters for background tasks:

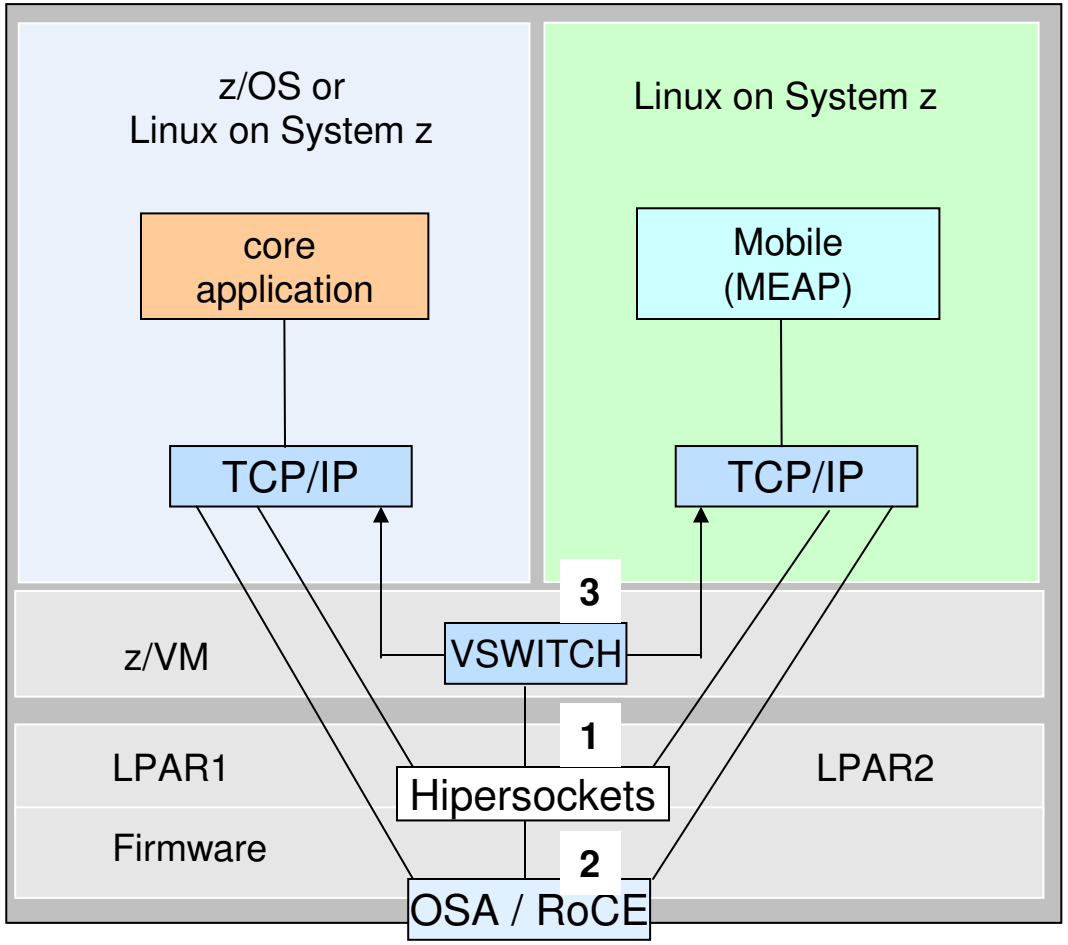
- cluster.data.synchronization.taskFrequencyInSeconds – The parameter controls the sync interval of the file system with the database content.
  - default is 2 seconds
  - application and adapter files are stored in the database for synchronization of the deployment data between all cluster nodes
  - every 2 seconds every Worklight server node checks the Database to see if a new adapter or application was deployed in another Worklight server node and will deploy the adapter/application to local node & file system
  - Increasing this fequency number will cause fewer queries on the database, however it will also increase the unsychncronized Worklight server nodes
- deployables.cleanup.taskFrequencyInSeconds – Delete unused deployables from the file system.
  - default is 24 hours.
- sso.cleanup.taskFrequencyInSeconds –The SSO (Single Sign on) mechanism stores session data in a database table.
  - this parameter defines the interval for the SSO cleanup task
  - default is 5 seconds (every 5 seconds accounts are checked for inactivity - idle for more than serverSessionTimeout)
- push.cleanup.taskFrequencyInSeconds – Delete inactive push notification subscriptions, currently implemented only for Apple APNS.
  - Default is 60 minutes.

Worklight Server on WebSphere on Linux on System z Production High Availability



Solid Lines denote primary data path, dashed lines denote backup data path.

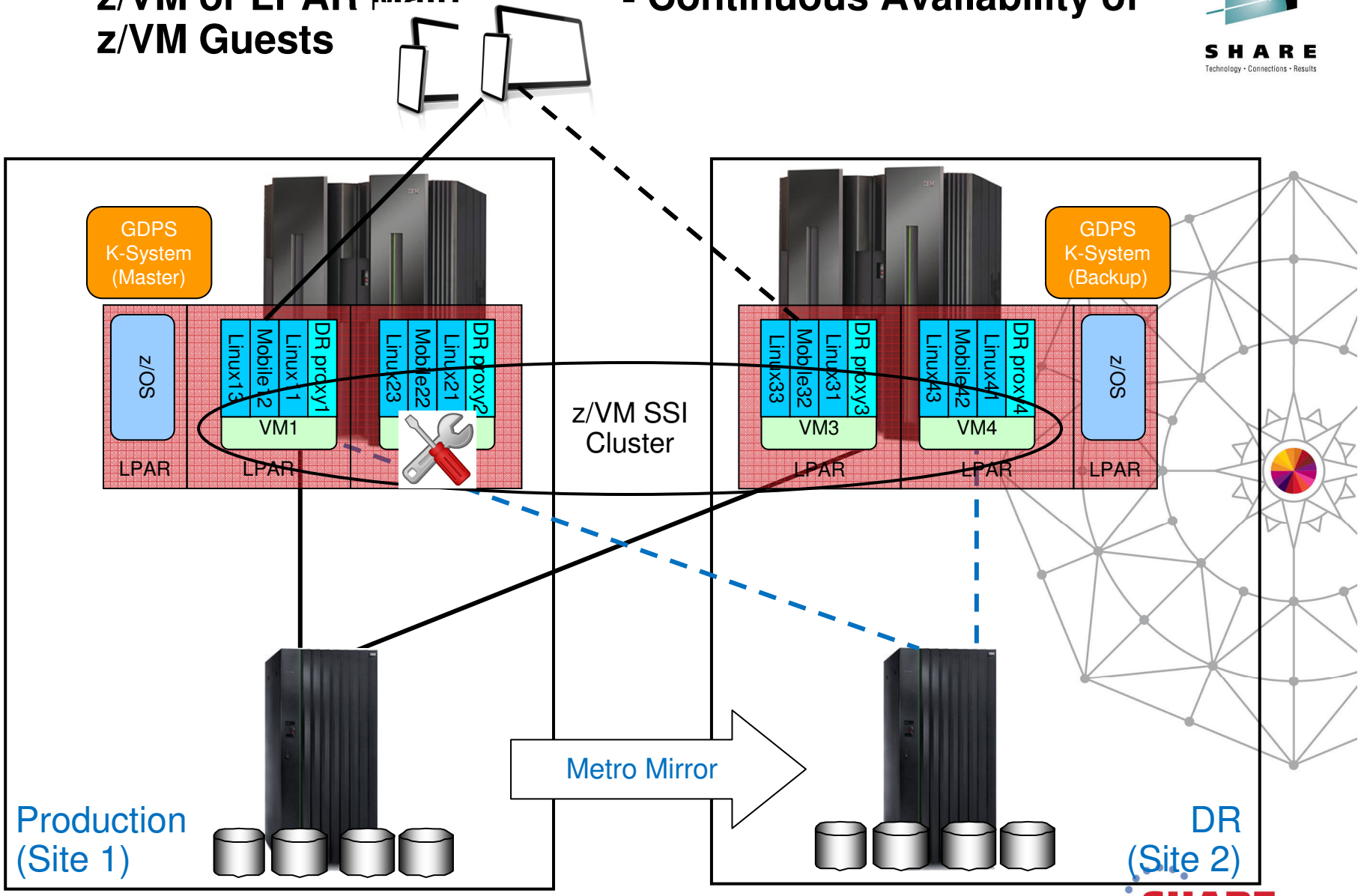
System z internal network alternatives



1 - Hipersockets
2 - shared OSA /RoCE
3 - z/VM VSWITCH

z/VM SSI and GDPS support

z/VM or LPAR Maintenance - Continuous Availability of z/VM Guests



System z Ha and DR scenario

Mobile: understand IBM System z value

Business challenges

Mobile is about re-imagining your business around constantly connected customers, partners and employees. to sell products or retain customers.

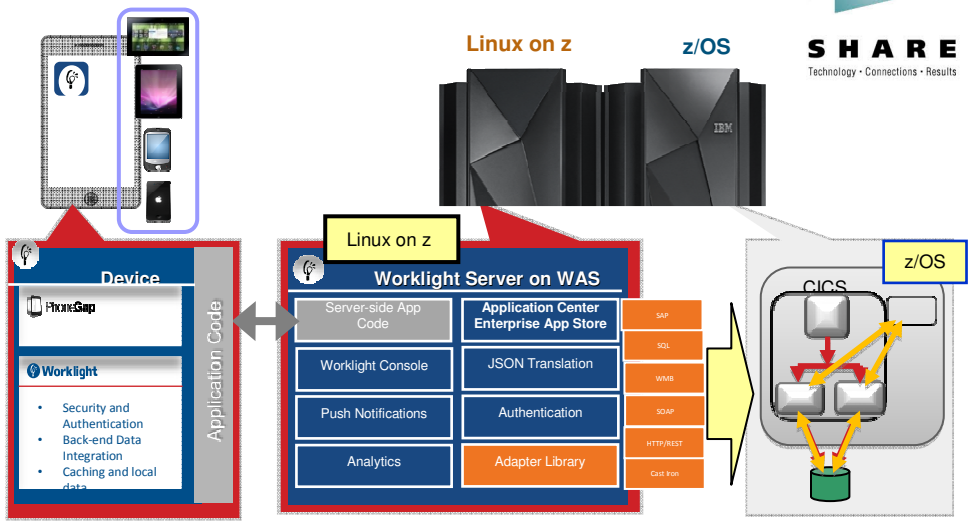
Business solution & Benefits

Mobile solutions are pushing companies to rethink the user experience, from the presentation of data to the interaction.
The mobile engagement allows you to build new insight into your customer's behavior so that you can anticipate their needs and gain a competitive advantage by offering new services.

IT Challenges

Mobile has characteristics that causes to rethink or redefine IT architectures and implementations.

- Unpredictable workloads that can vary any minute of the day.
- Very high demanding customers that expects 24/7/365 to be serviced. With fast response times.
- The security of Mobile ranges from mobile Endpoint security to prevent malicious attacks on back end systems. And everything in between.
- Integrating mobile apps into existing application landscape.

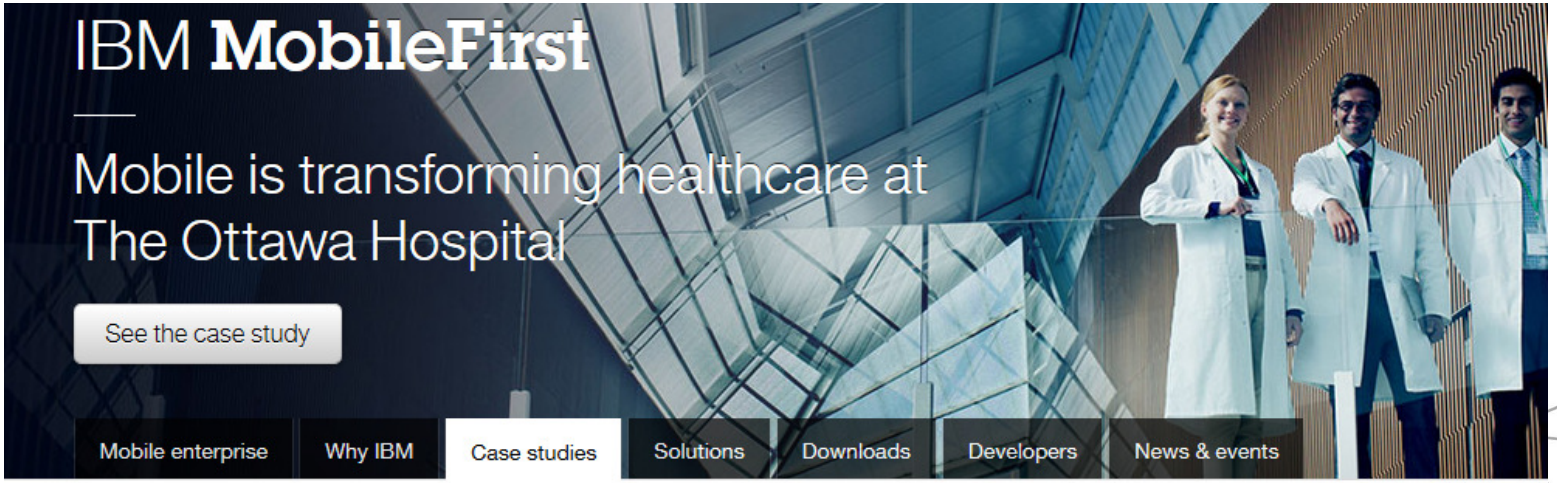


Infrastructure benefits

- Massive scalability in a single footprint, to handle the workload of millions of devices and sensors
- Workload Management to provide a quick reaction to sharp spikes in demand
- Hardware encryption speeds SSL applications
- System z may also have other roles in the overall security architecture e.g security policy management, certificate and key management
- Business Resiliency for critical mobile apps
- Integration of co-located existing Applications, Services and Systems of Record

Additional information in Mobile Redbooks

- ***Transform Your Organization into a Mobile Enterprise with IBM Worklight***, *Solution Guide,* published 9 October 2013
- ***Extending Your Business to Mobile Devices with IBM Worklight***, SG24-8117-00 ***Red****books,* published 12 August 2013
- ***IBM MobileFirst Strategy Software Approach***, SG24-8191-00 *Draft* ***Red****books, 5* December 2013
- ***IBM System z in a Mobile World***, *Solution Guide,* published 21 February 2014
- ***System z in a Mobile World***, REDP-5088-00, *Point-of-View,* 24 January 2014
- ***Implementing IBM CICS JSON Web Services for Mobile Applications***, TIPS1066 *Solution Guide,* 9 September 2013
- ***Securing Your Mobile Business with IBM Worklight***, SG24-8179-00, 7 October 2013
- ***Enabling Mobile Apps with IBM Worklight Application Center***, REDP-5005-00 ***Red****papers,* 1 June 2013
- ***Responsive Mobile User Experience Using MQTT and IBM MessageSight***, SG24-8183-00 *Draft* ***Red****books,* last update 18 December 2013
- ***Mobilizing Employees with IBM Notes Traveler***, *Solution Guide,* published 19 February 2013



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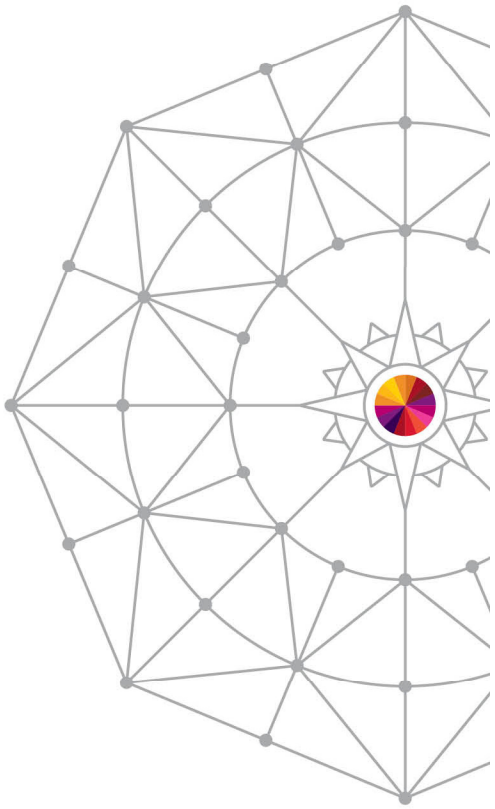

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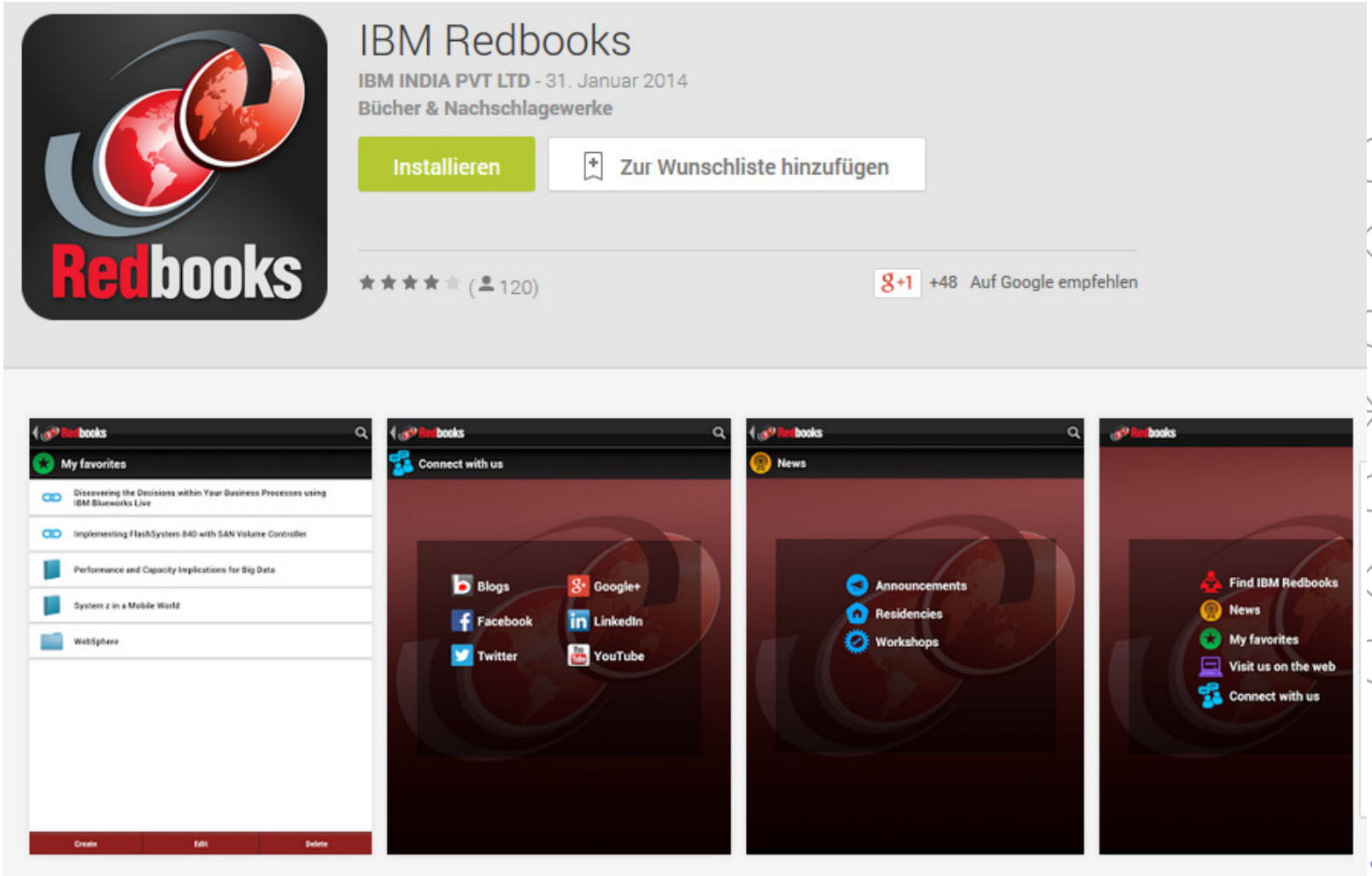

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Wellcome to the Mobile era !

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