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Mobile Client Architecture

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Introduction

- Choosing appropriate client architectures is very important to develop mobile applications with high quality and productivity
- The design of mobile applications must take into account several unique aspects like the device form factor, sporadic connectivity, variable bandwidth, multi-platform support and user experience.
- The three client architectures – Web App, Native App and Hybrid App – differ significantly.

➔ In this speech, I will discuss the mobile client architectures and its environments

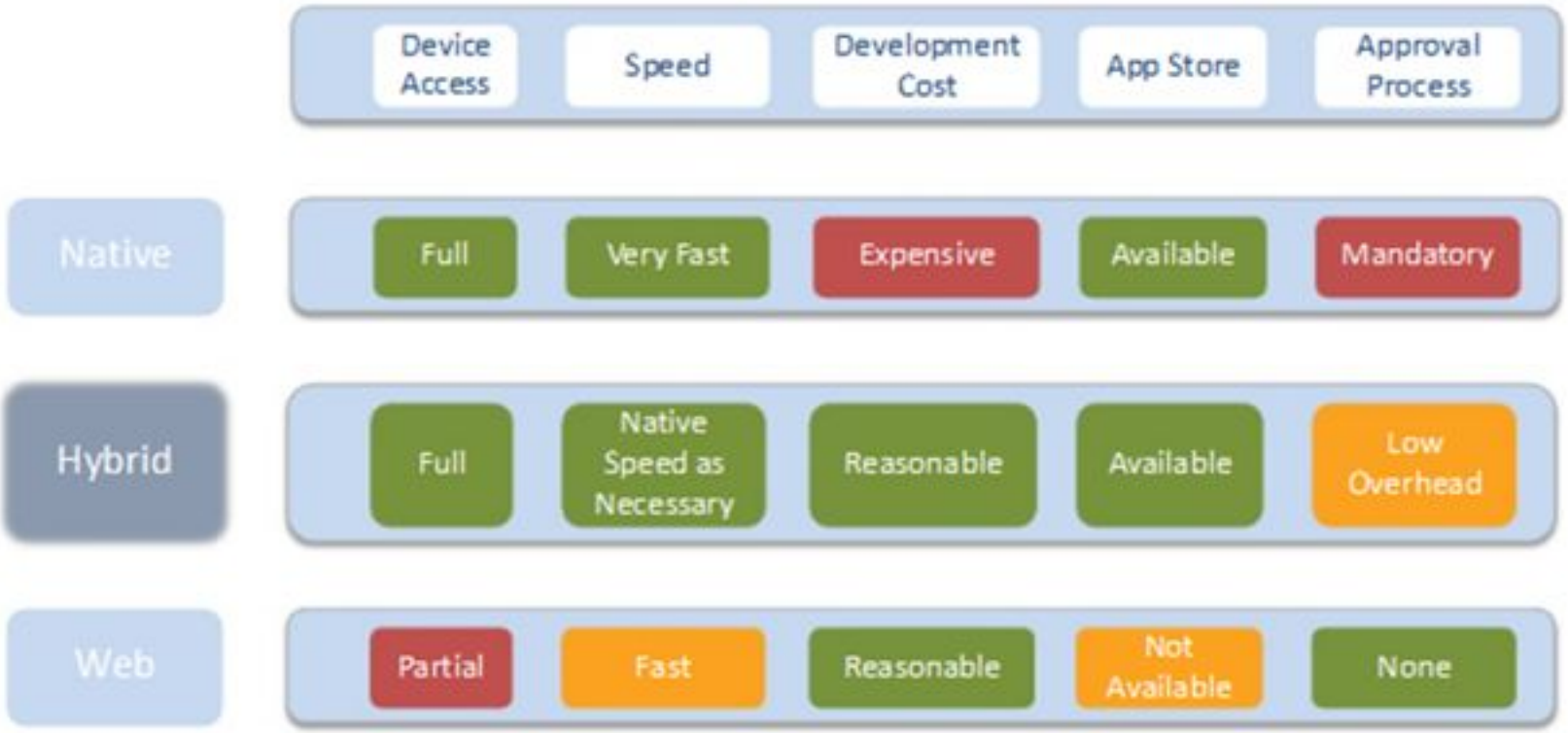
Web Apps vs. Native Apps vs. Hybrid Apps

- One of the first steps for development of any mobile application is selecting the right client architecture. There are three popular approaches today:

- Web Apps
  - the application runs on a mobile browser. The browser only hosts the application's presentation layer that is designed using HTML5.
- Native Apps
  - the mobile application is custom built for the target device operating system with a compiled programming language like Objective C and using the native SDK
- Hybrid Apps
  - This approach emerged to address the inability of the Web App approach to access device sensors (like cameras and Bluetooth) while preserving its highly desirable cross-platform support.

Web Apps vs. Native Apps vs. Hybrid Apps

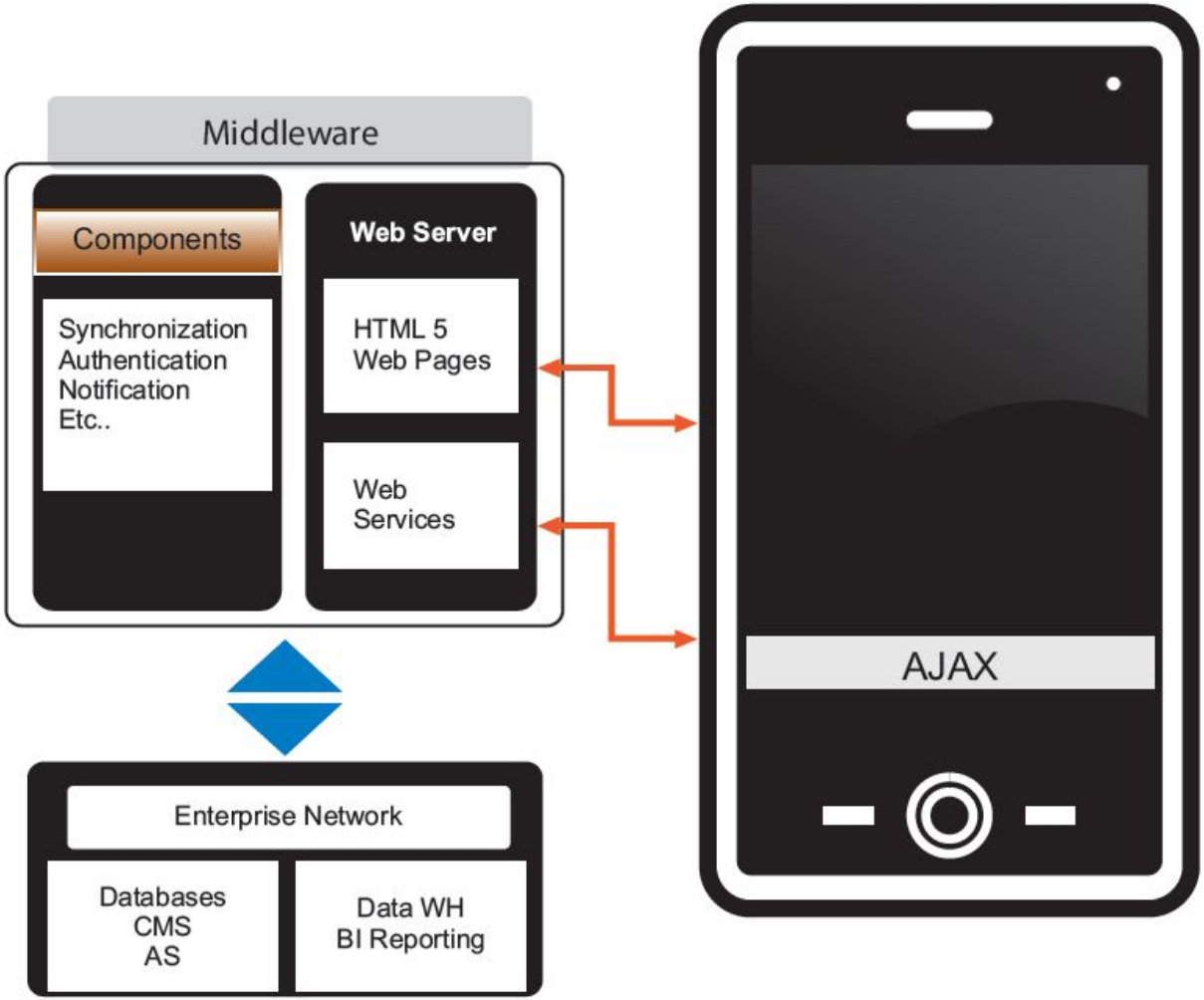
Layout of Client 3 tiers



Mobile Web Approach

- Relying on the web browser
- Mobile web apps are designed to run on a mobile web browse r. HTML5 is the most popular and promising technology for ’ Write Once Run Anywhere.
- Almost all mobile web browsers running on high-end mobile devices support HTML5 to a large extent,
- This is thin client and 1 layer Architecture

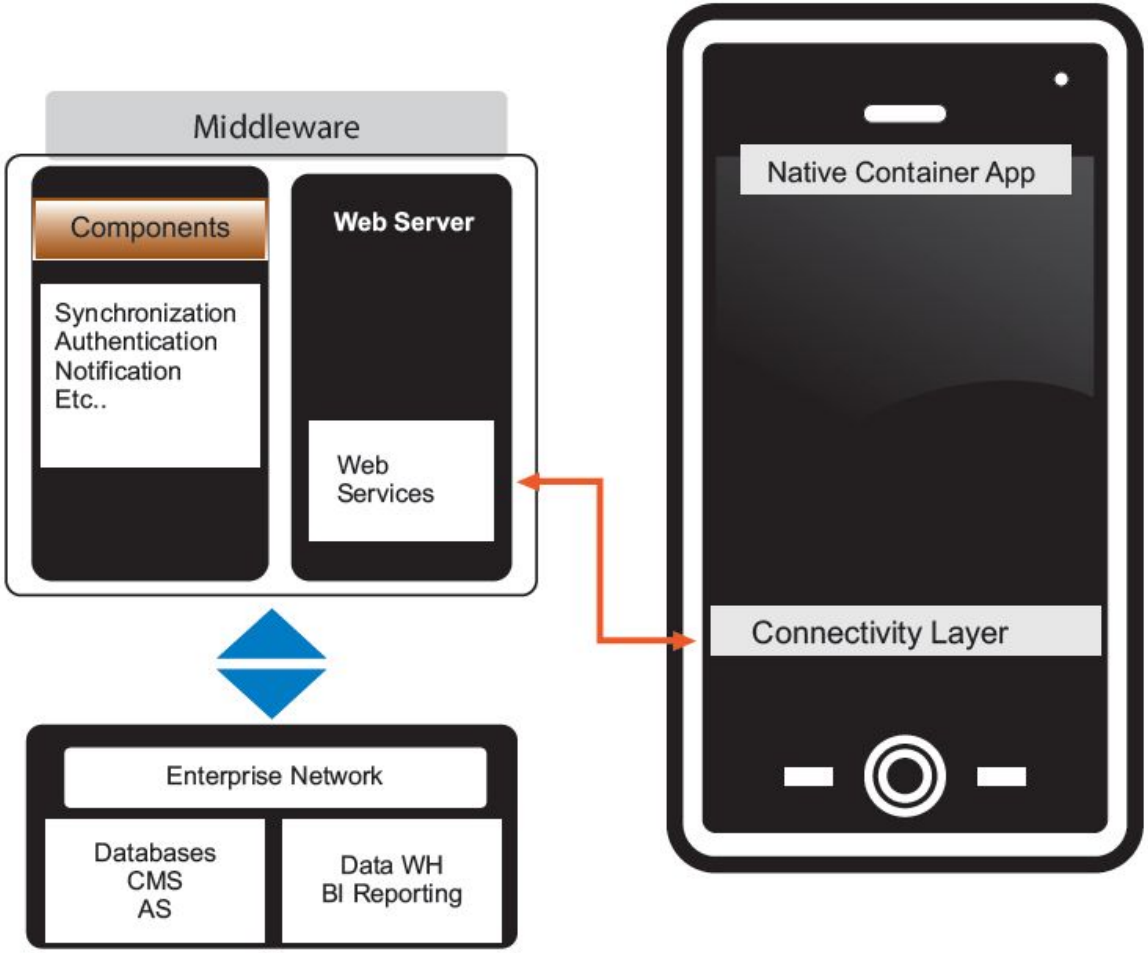
Mobile Web Approach



Native App Approach

- Mobile native apps are built using the native device operating system APIs and SDKs.
- These are coded using a platform specific language like Objective C for iOS, Java for Android, and C# for Windows phone
- This is Rich client and 2 layer Architecture

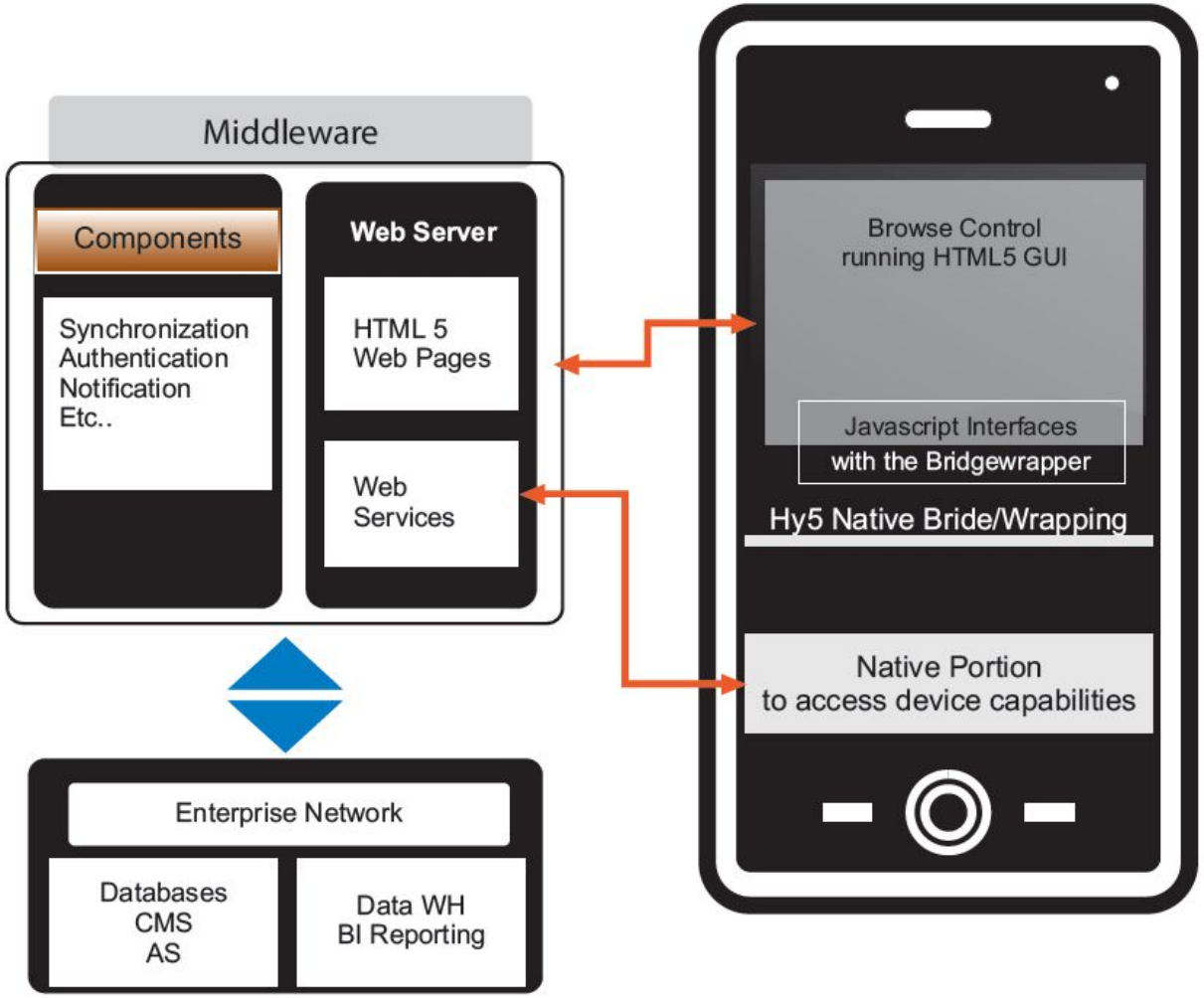
Native App Approach



Hybrid App Approach

- This approach achieves the middle ground between native mobile applications and mobile web applications.
- While mobile web apps attempt to provide platform independence, the price one pays for this is that they do not function when the device is offline and they cannot access device hardware like the camera, Bluetooth, accelerometer, or compass.
- The Hybrid App approach evolved to deliver platform independence while providing access to the device hardware and offline operation.
- This is Rich client and 3 layer Architecture

Hybrid App Approach



Key Technical Criteria for Evaluating Mobile Architecture

- **Access to Hardware Sensors**
  - One of the main disadvantages of the Web App approach is the inability to access device capabilities.
  - Hybrid App can access all device sensors. Most popular hybrid application development frameworks provide access to almost all the important device capabilities.
  - Native apps are ideally suited to use all the device sensors and various peripherals. It would provide a seamless and native user experience that is responsive.
- **Performance**
  - Mobile web apps and hybrid apps are slower since their code is interpreted by the JavaScript engine running within the browser.
  - when it comes to computational needs, the Native App approach outperforms the other two approaches by a wide margin.

Key Technical Criteria for Evaluating Mobile Architecture

❖ Native Look and Feel

- There are several web frameworks that provide libraries that can be used by mobile web apps and hybrid apps to re-create and imitate native mobile interfaces and behavior.
- Of course with the Native App approach, one automatically gets the native look and feel.

❖ Search, Distribution and Upgrades

- Mobile web apps can be hosted on a web server like any website; they do not require any download or installation.

- In contrast, native apps and hybrid apps are typically hosted in an app store and must be downloaded and installed.

Key Technical Criteria for Evaluating Mobile Architecture

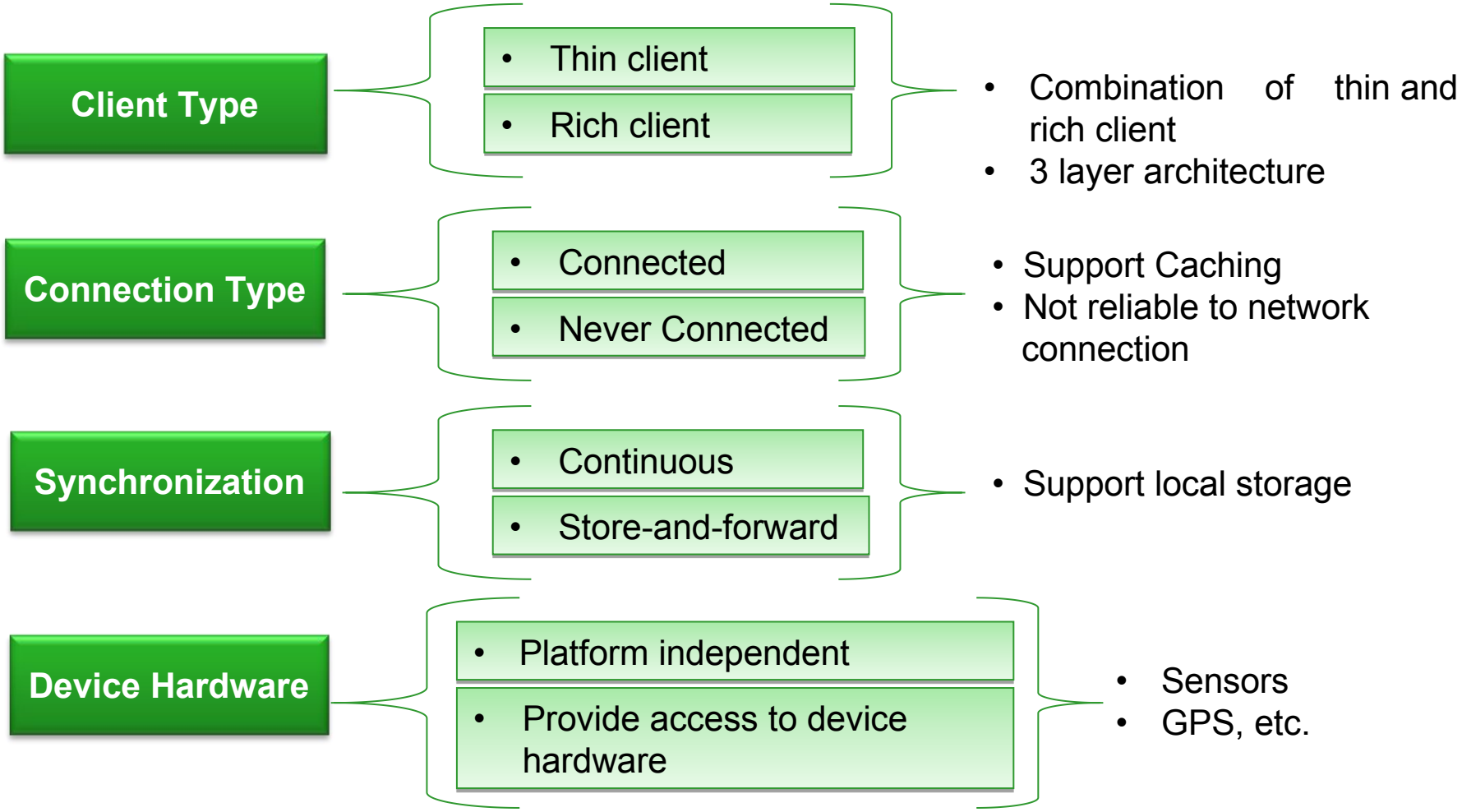
- **Offline Capability**
  - Web apps require connectivity to be operational.
  - Native and Hybrid App approaches, one can access the device database and implement a synchronization engine that would allow seamless operation when the device has sporadic connectivity.
  - Hybrid App approach, the images, or videos are typically inserted inside the app and thus don't need to be downloaded from any server.
- **Development & Testing**
  - For a typical native application, roughly 20% of the effort is user experience design, 20% is requirements and design, 40% is development and 20% is testing and miscellaneous.

What is Smart App?

- Combine the benefits of Web App, Native App and Hybrid App.

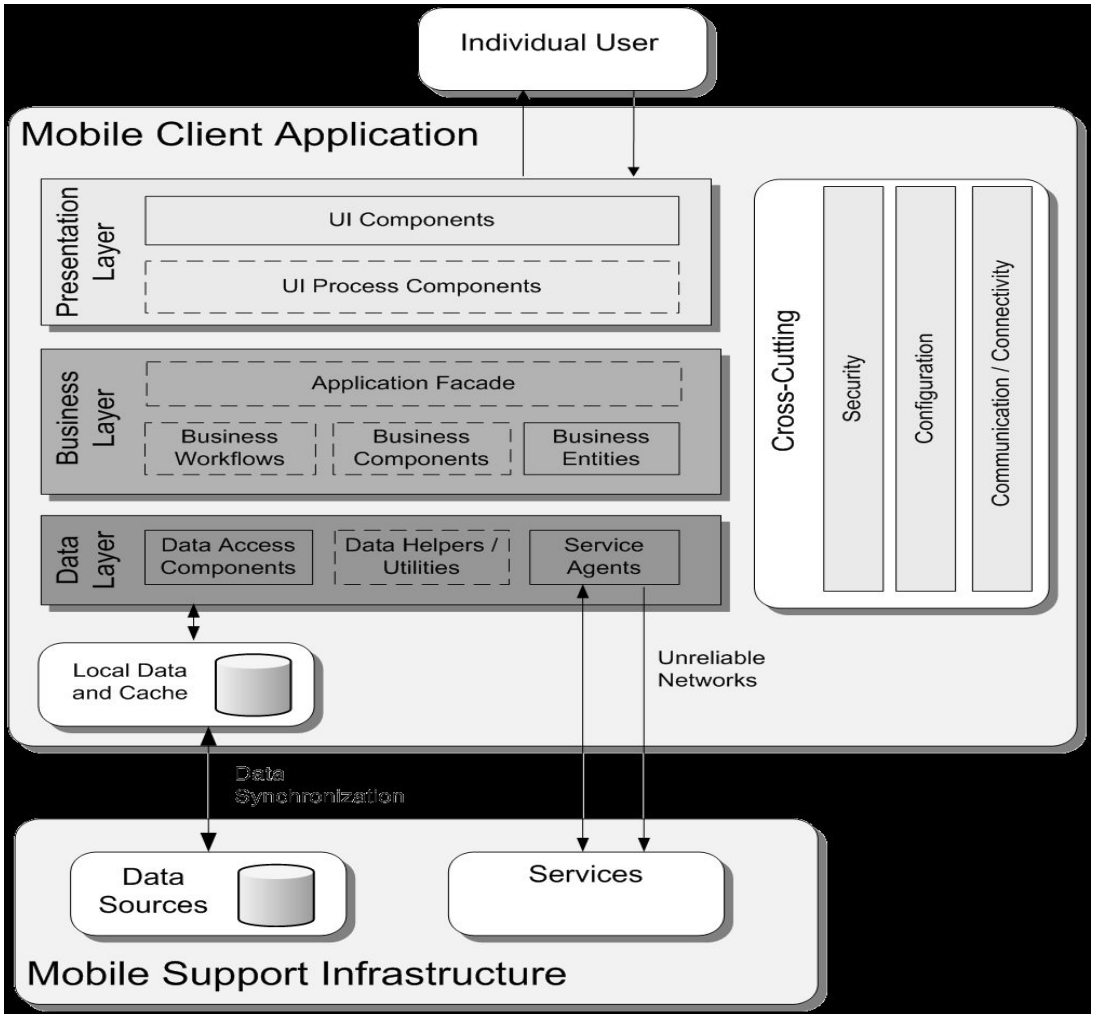
- All Smart App share some or all of the following characteristics:
  - Make use of local resources
  - Make use of network resources
  - Support occasionally connected users
  - Provide intelligent installation and update
  - Provide client device flexibility

Smart App Architecture Requirements



Designing of Reference Mobile clients Architecture

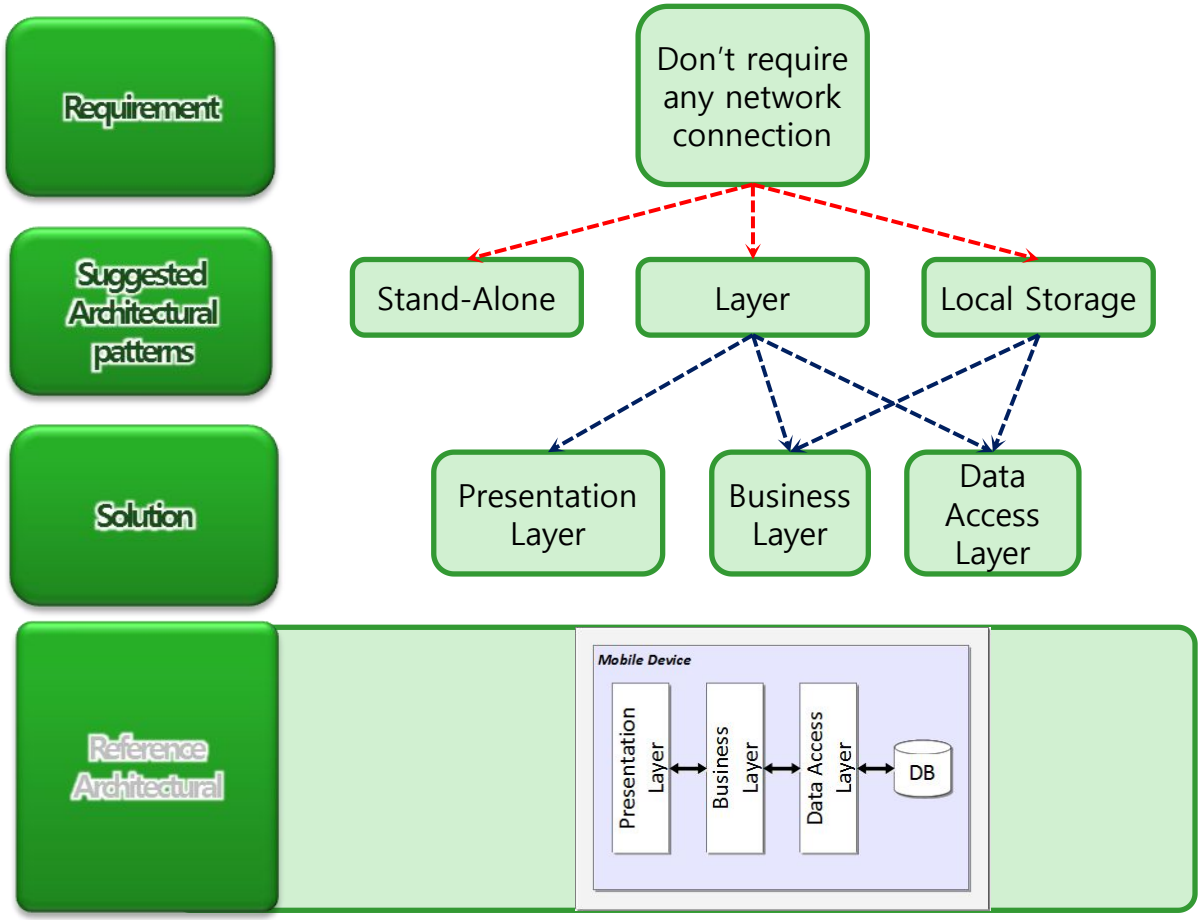
Overall Mobile Clients Software Architecture



Exemplified Scenarios (1)

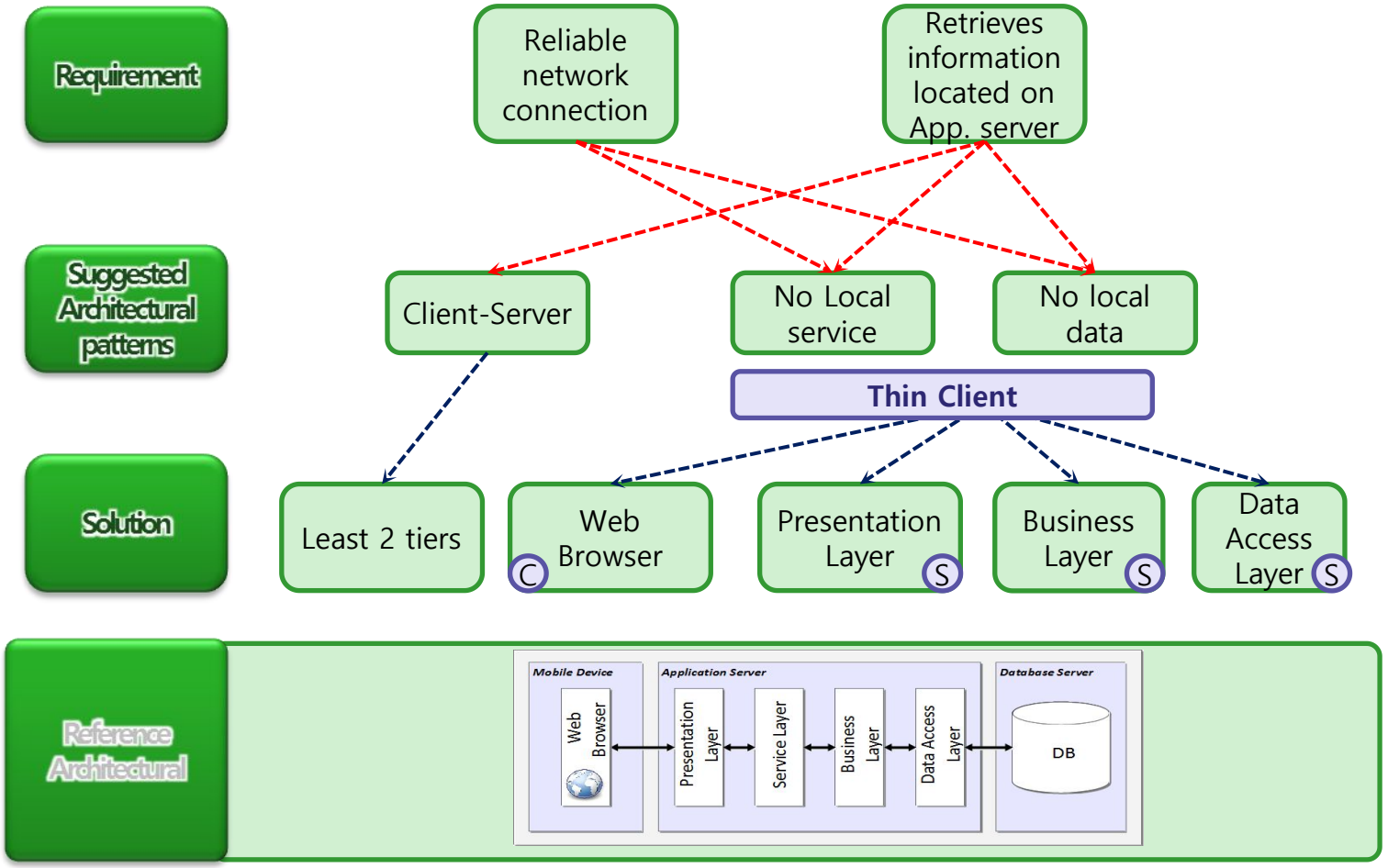
- The section present the Reference Mobile Architecture scenario.
- There are four scenarios to exemplify the thin, rich and smart clients

Scenario 1



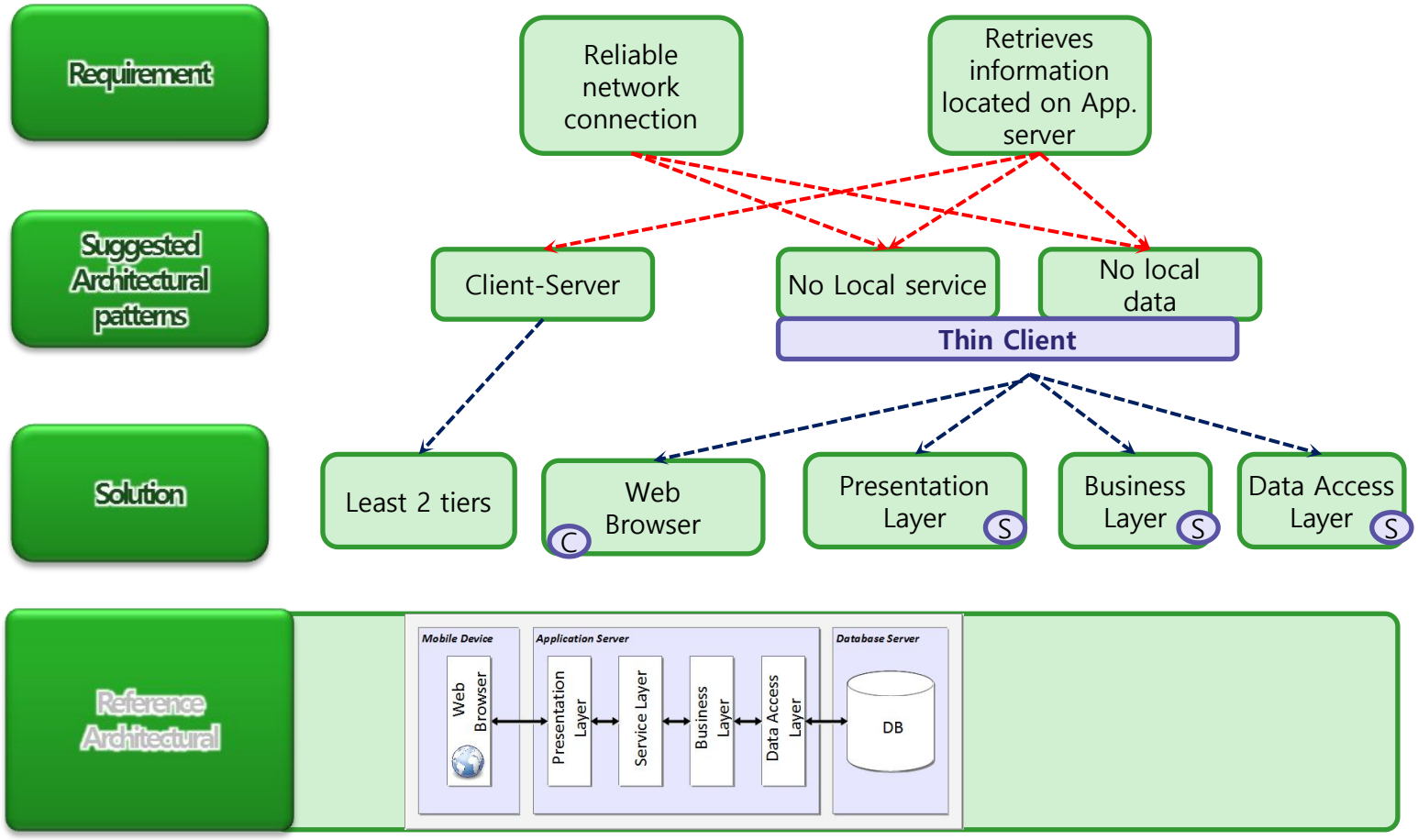
Exemplified Scenarios (2)

Scenario 2



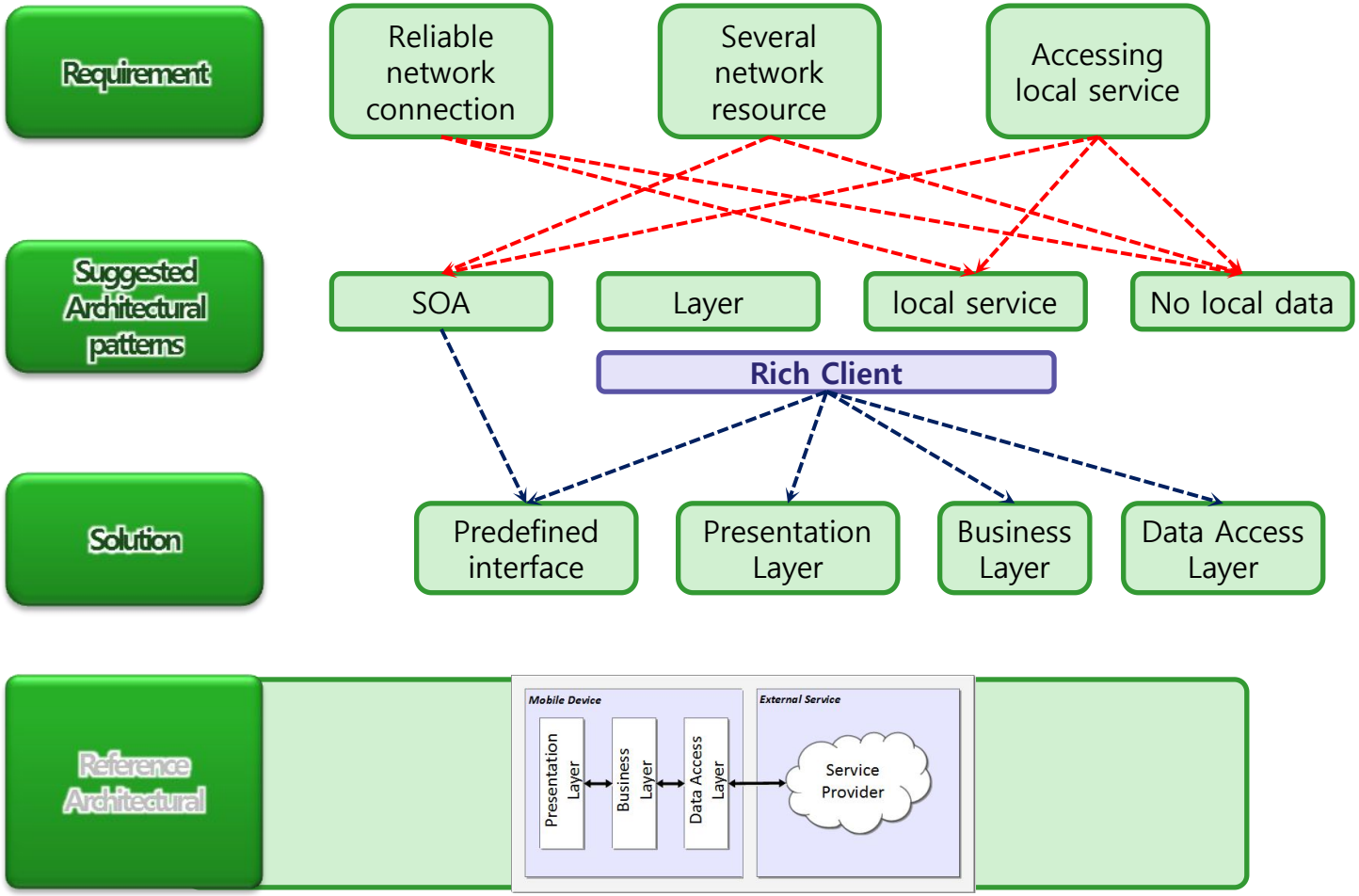
Exemplified Scenarios (3)

Scenario 3



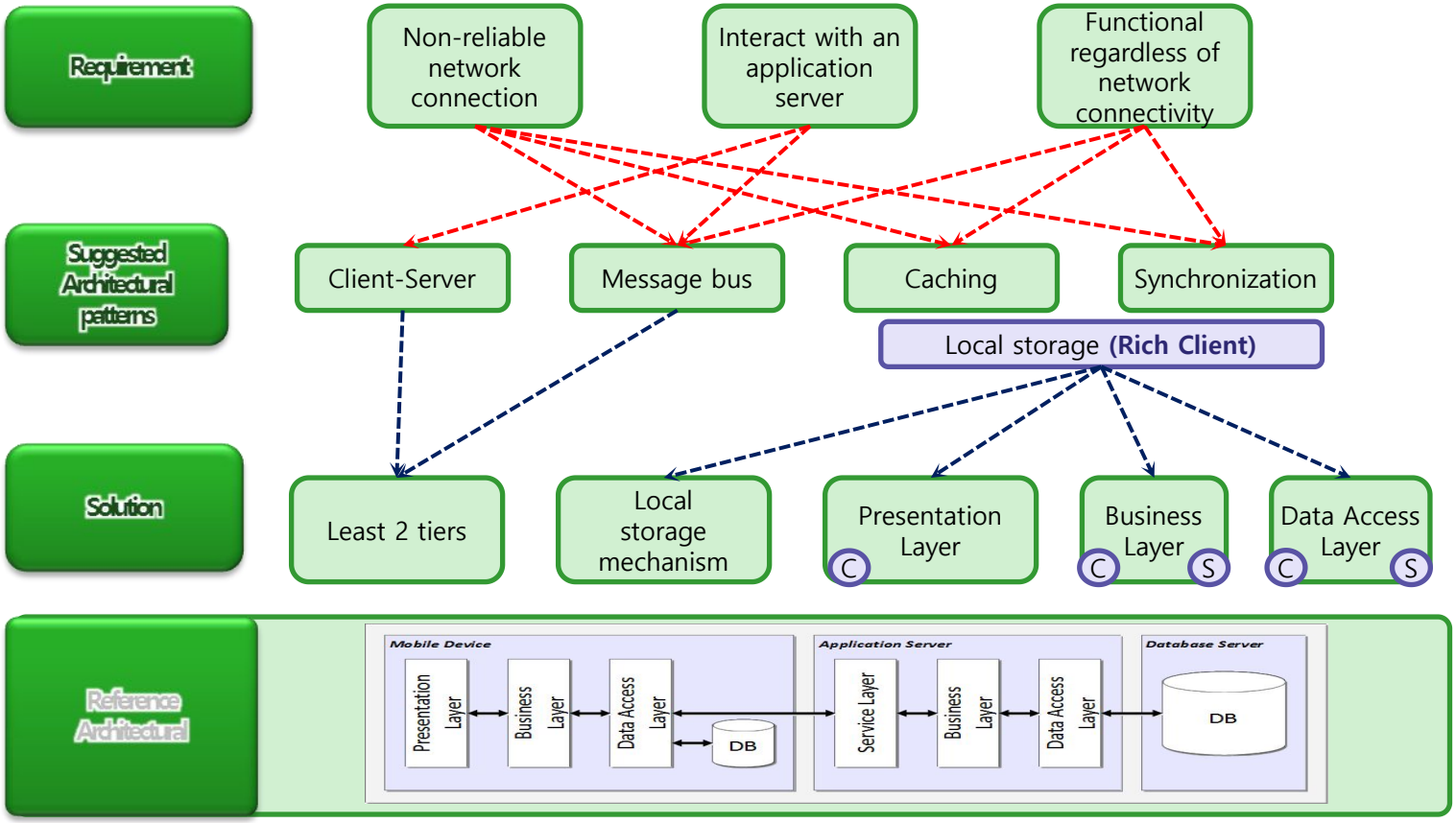
Exemplified Scenarios (4)

Scenario 4



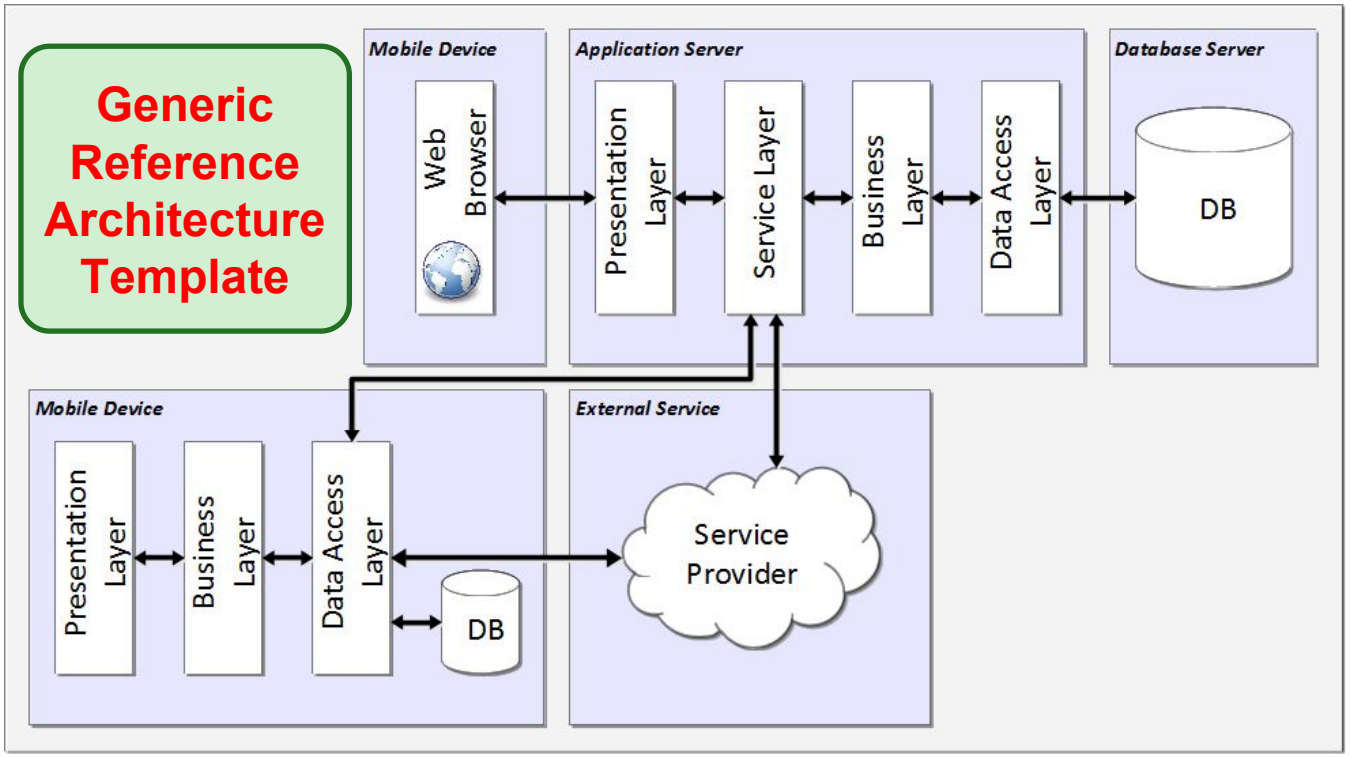
Exemplified Scenarios (5)

Scenario 5



Reference Mobile Architecture

- Presents a generic scheme for its solutions
- Describes one or several solution for each particular recurring design challenge



Conclusion

- **Purpose**
  - **Discussed the differences between Native App, Web App, Hybrid App and Smart App**
  - **Discussed the client and server architecture of mobile devices**
  - **Discussed the mobile connection and synchroni zation types**
- **Introduced the Smart App**
  - **Capabilities**
  - **Requirements**
- **Generic Reference Architecture Template**

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- Mobile Application Pocket Guide v1.1
- Microsoft patterns & practices 112
- • For more information on authorization techniques, see *Designing Application-Managed*
- *Authorization at http://msdn.microsoft.com/en-us/library/ms954586.aspx .*
- • For more information on deployment scenarios and considerations, see *Deploying .NET*
- *Framework-based Applications at http://msdn.microsoft.com/enus/*
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- • For more information on design patterns, see *Enterprise Solution Patterns Using Microsoft*
- *.NET at http://msdn.microsoft.com/en-us/library/ms998469.aspx .*
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Thank you for listening!
Q & A.