Integrating Passbook into Your Ecosystem

Session 303

Joelle Lam
Engineering Manager

Passbook

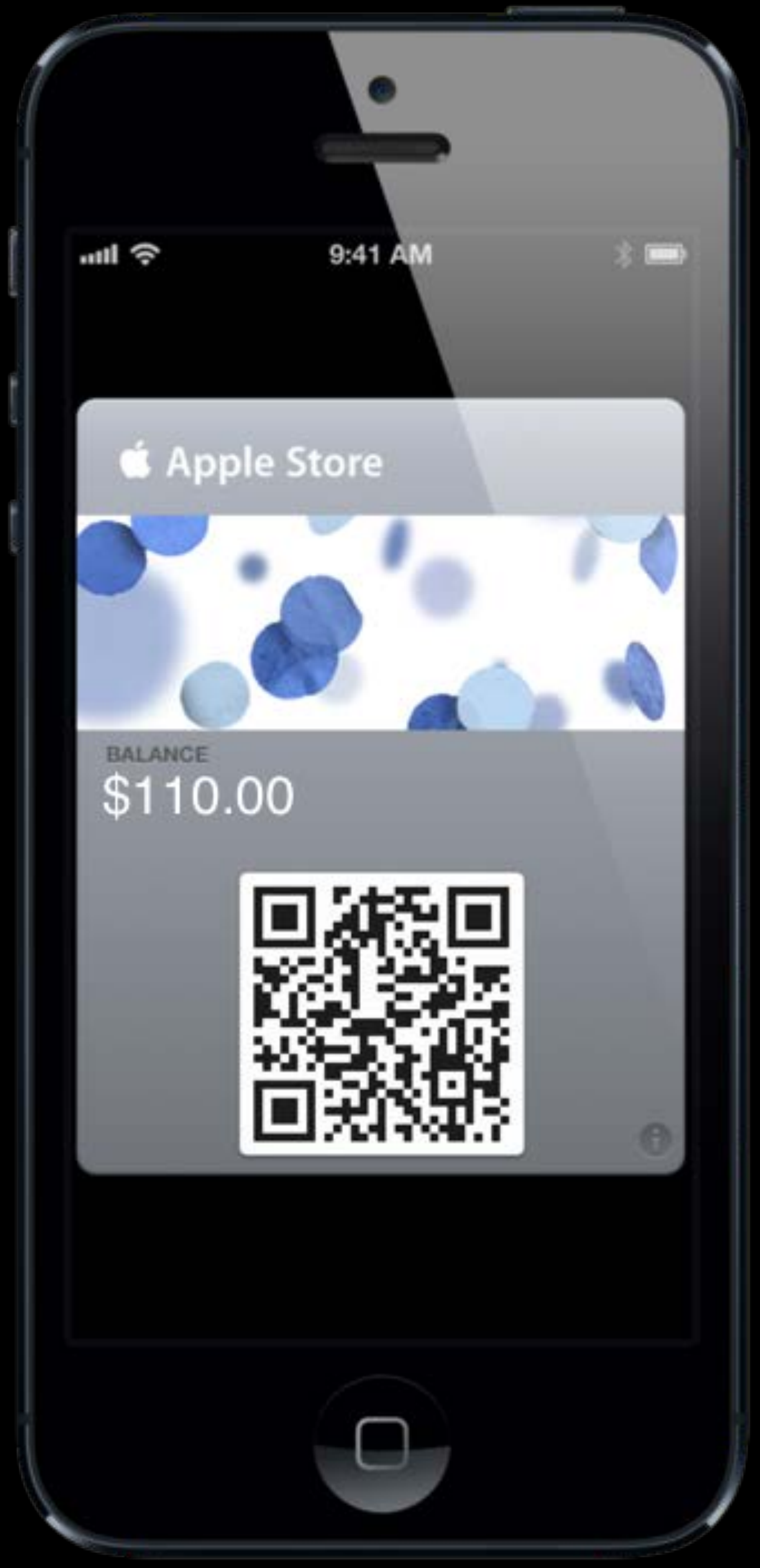
Re-imagine what’s in your pocket

Passbook

Enriching customer experiences via iOS technologies

Apple Store Gift Card

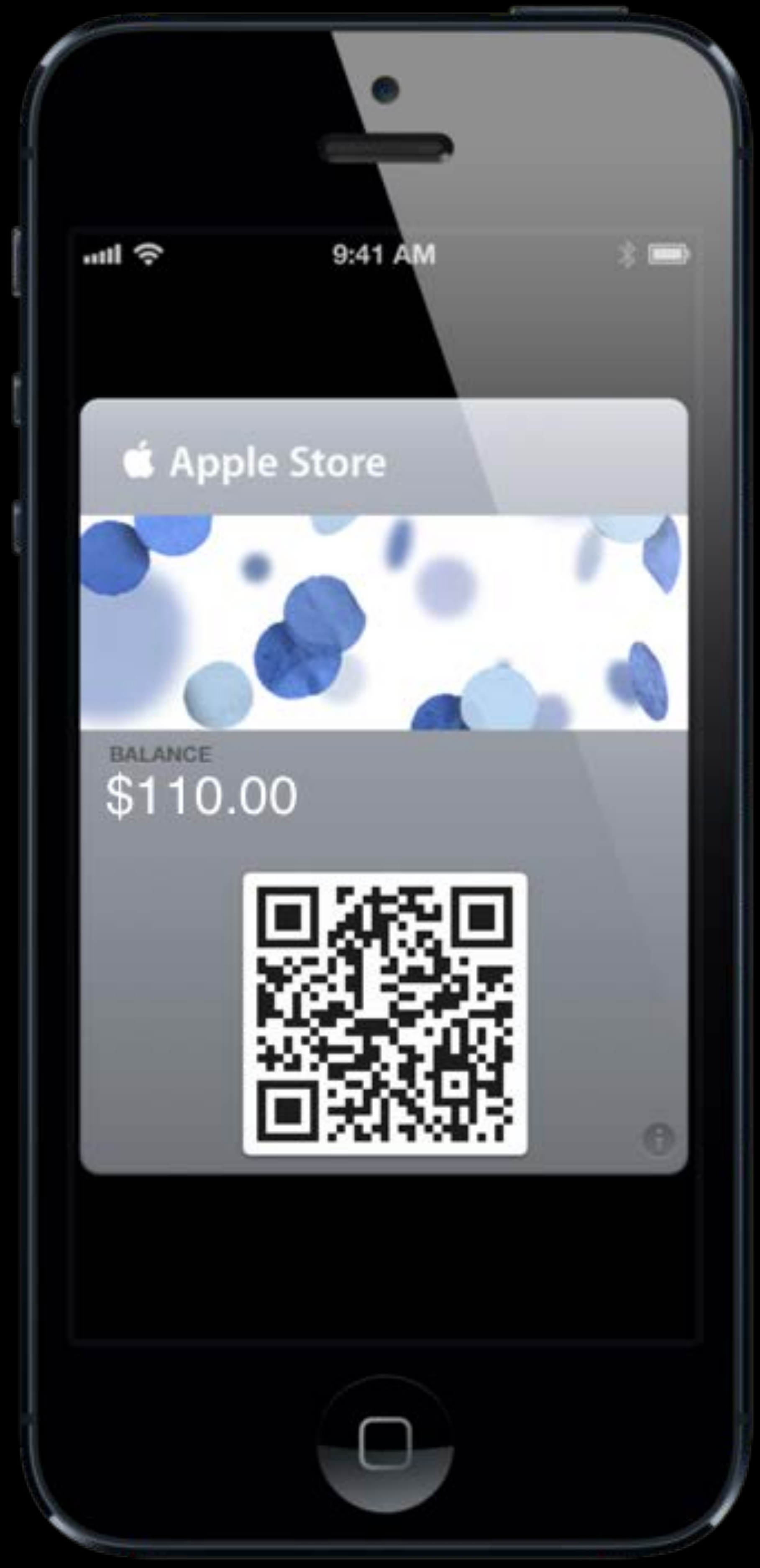
A pass implementation



BALANCE
$110.00

Overview

- Apple Store Gift Card
- Leveraging Existing Systems
- Determining Complexity
- Web Services Tips and Tricks

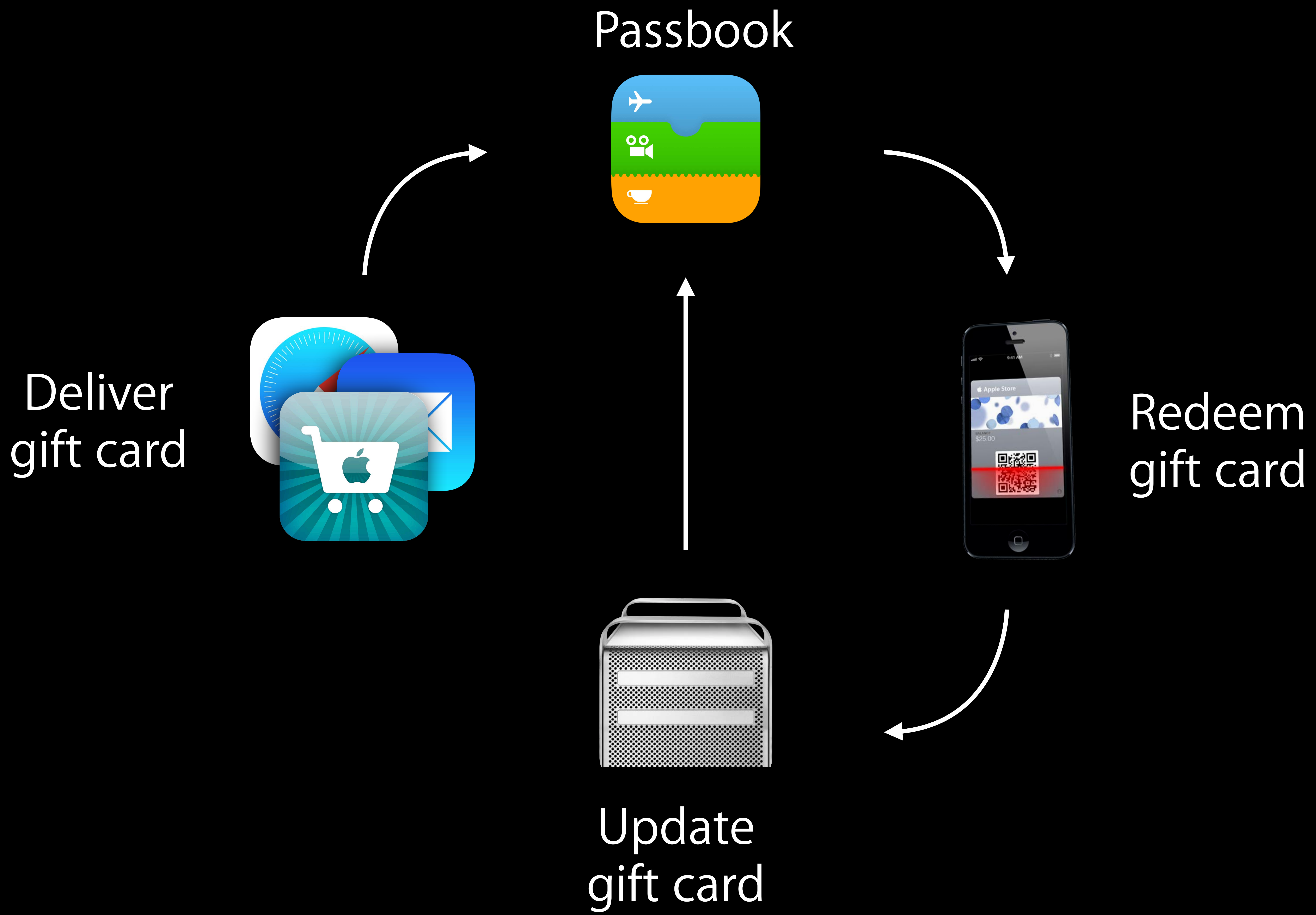


Apple Store Gift Card

Lifecycle review

Lifecycle

Apple Store gift card

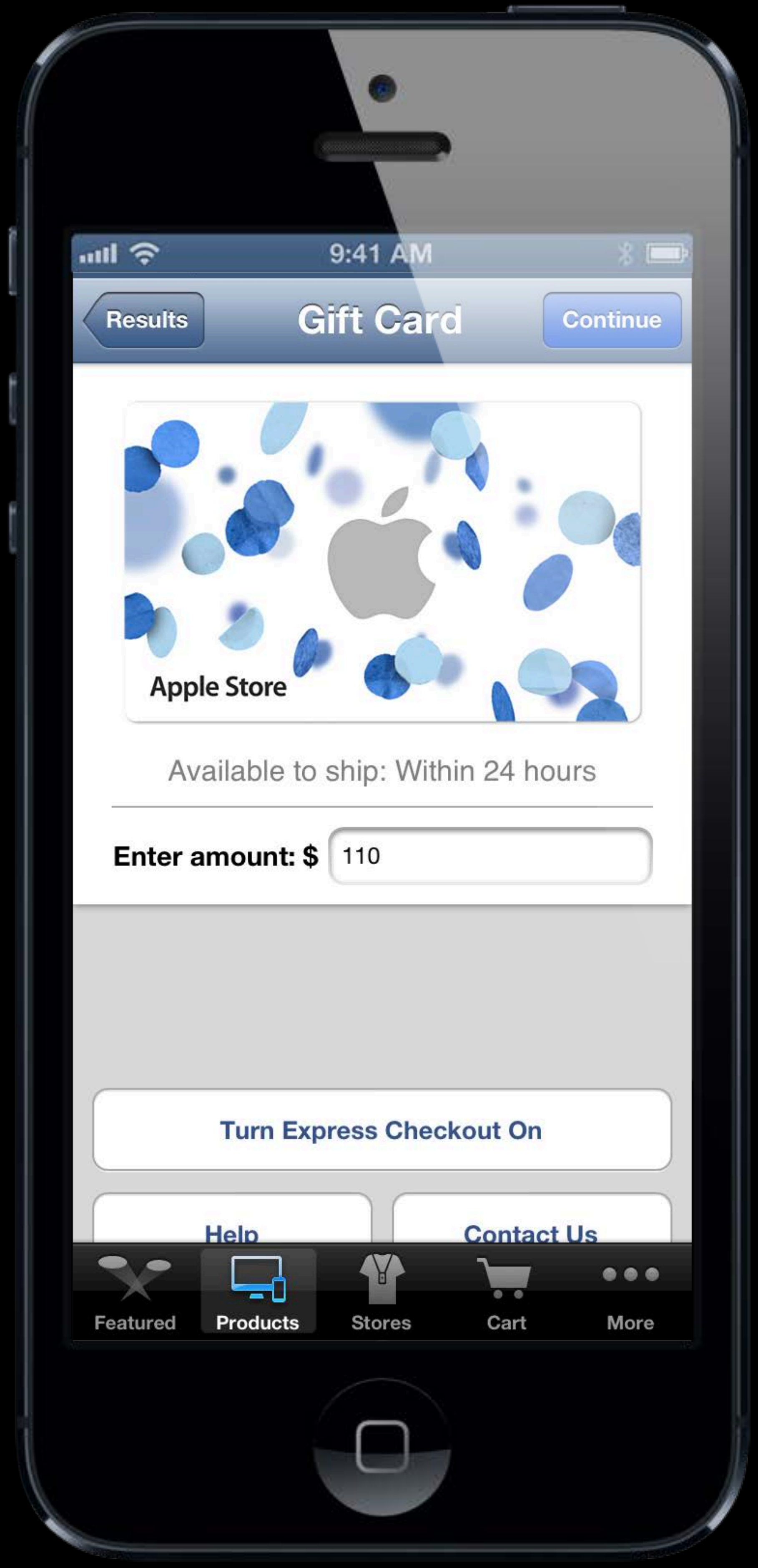


Deliver the Pass

Getting Apple Store gift card to the right user

Deliver the Pass

Step One—purchase


9:41 AM

Results | Gift Card | Continue

Apple Store

Available to ship: Within 24 hours

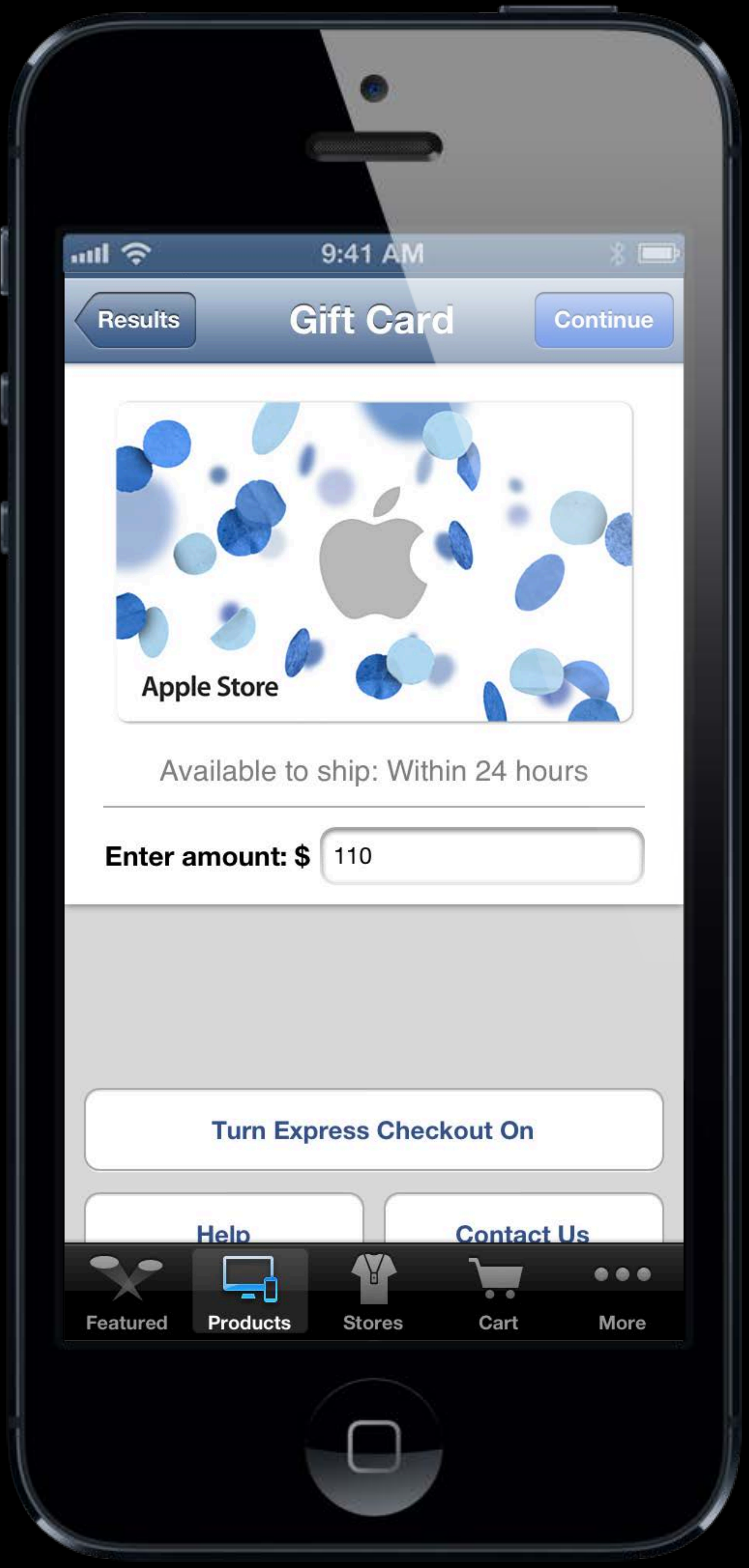
Enter amount: $ 110

Turn Express Checkout On

Help | Contact Us

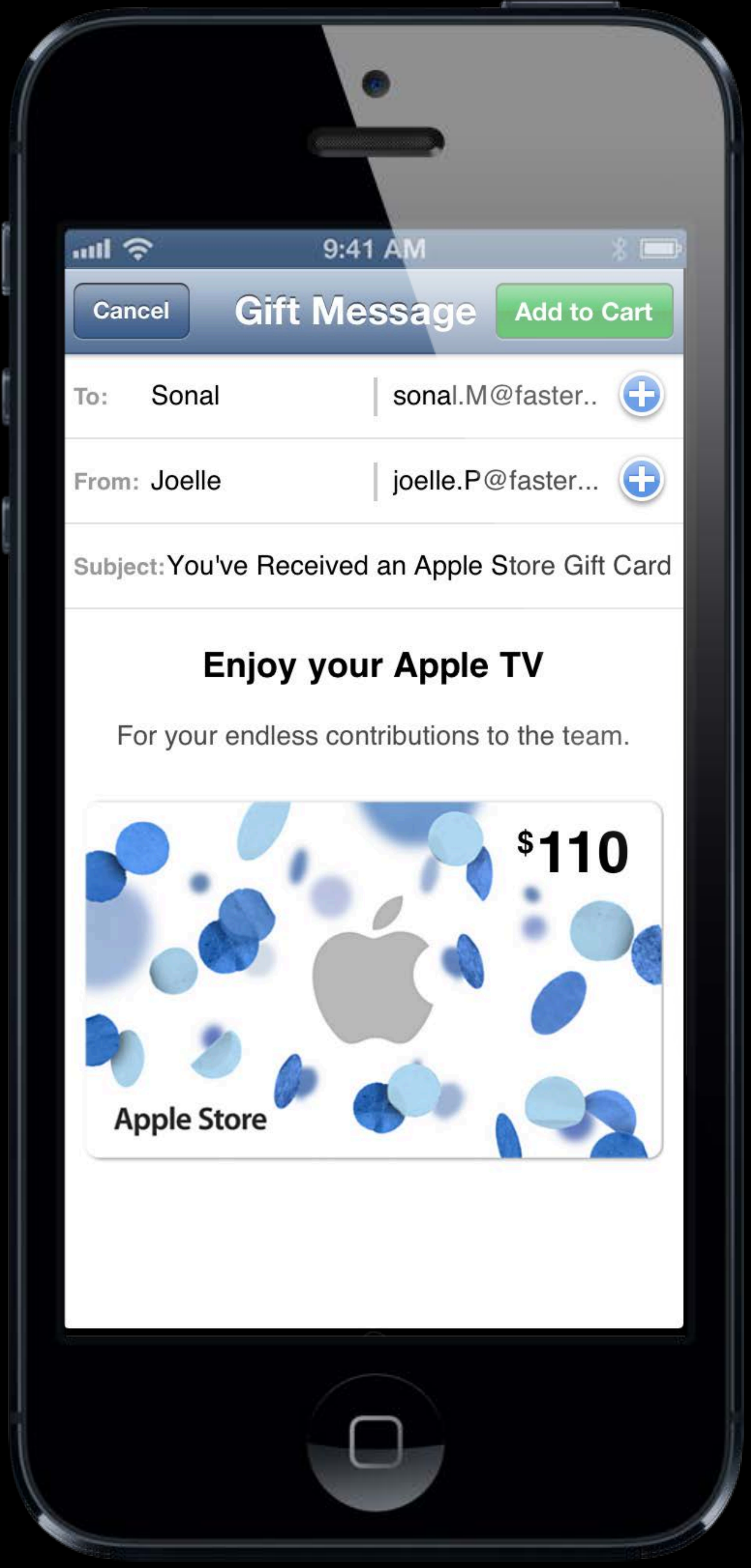
Deliver the Pass

Step Two—populate gift card recipient details



Available to ship: Within 24 hours

Enter amount: $ 110



To: Sonal sonal.M@faster..

From: Joelle joelle.P@faster...

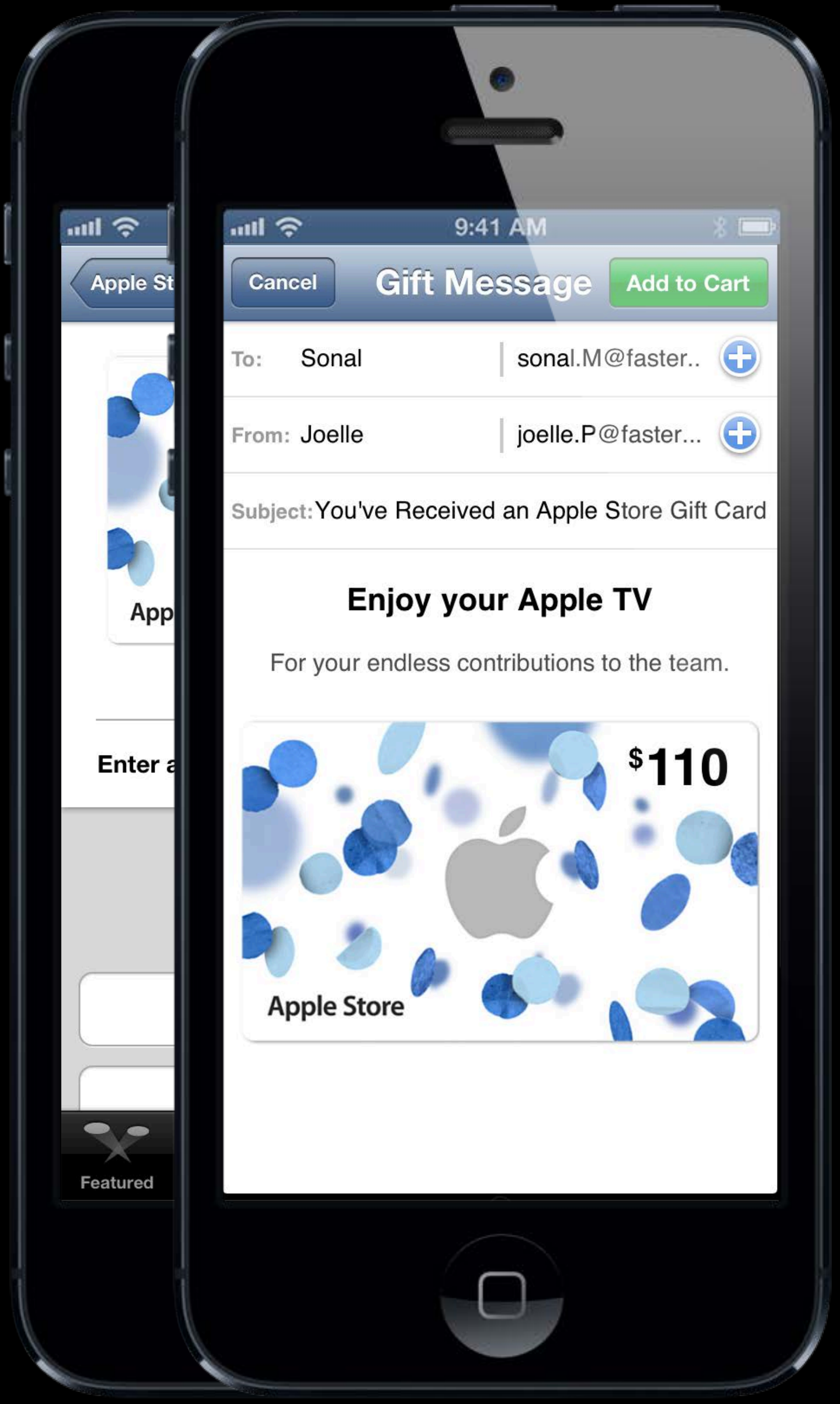
Subject: You've Received an Apple Store Gift Card

Enjoy your Apple TV

For your endless contributions to the team.

Deliver the Pass

Step Three—user receives a gift card



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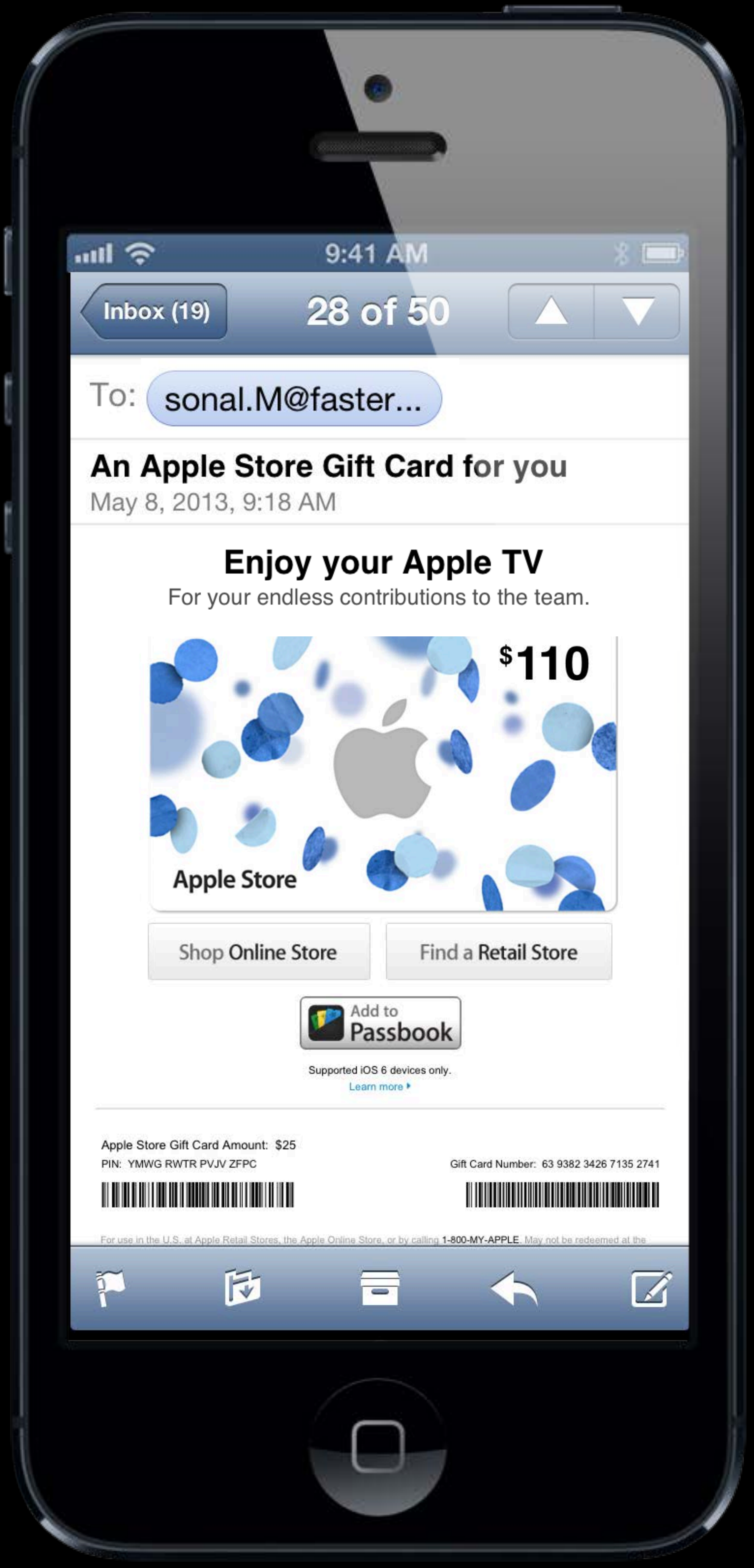
$110

Apple Store



To: sonal.M@faster...

An Apple Store Gift Card for you

May 8, 2013, 9:18 AM

Enjoy your Apple TV

For your endless contributions to the team.

$110

Apple Store

Supported iOS 6 devices only.

Learn more ▸

Apple Store Gift Card Amount: $25

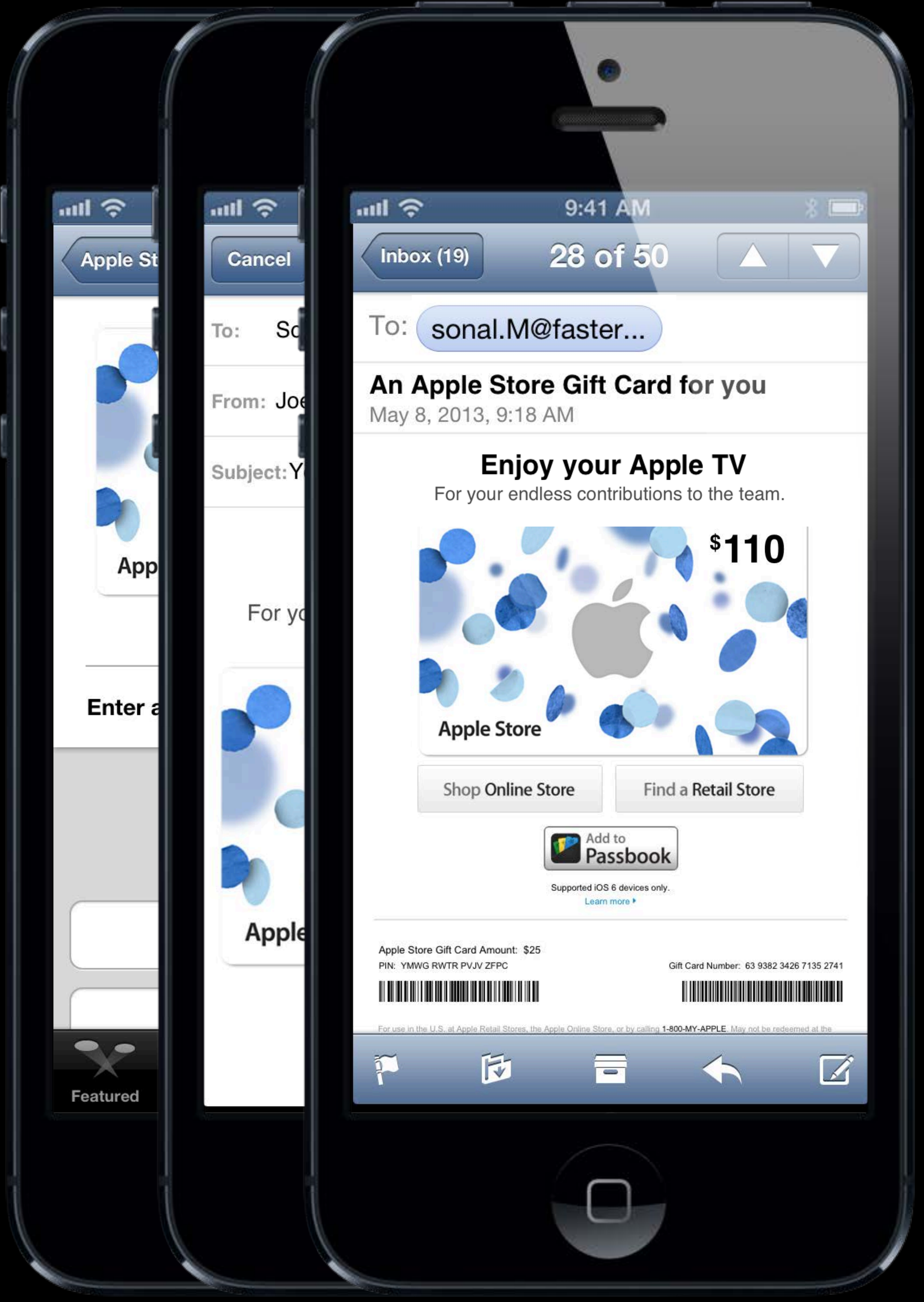
PIN: YMWG RWTR PVJV ZFPC

Gift Card Number: 63 9382 3426 7135 2741

For use in the U.S. at Apple Retail Stores, the Apple Online Store, or by calling 1-800-MY-APPLE. May not be redeemed at the

Deliver the Pass

Step Four—user clicks add to Passbook



To: sonal.M@faster...

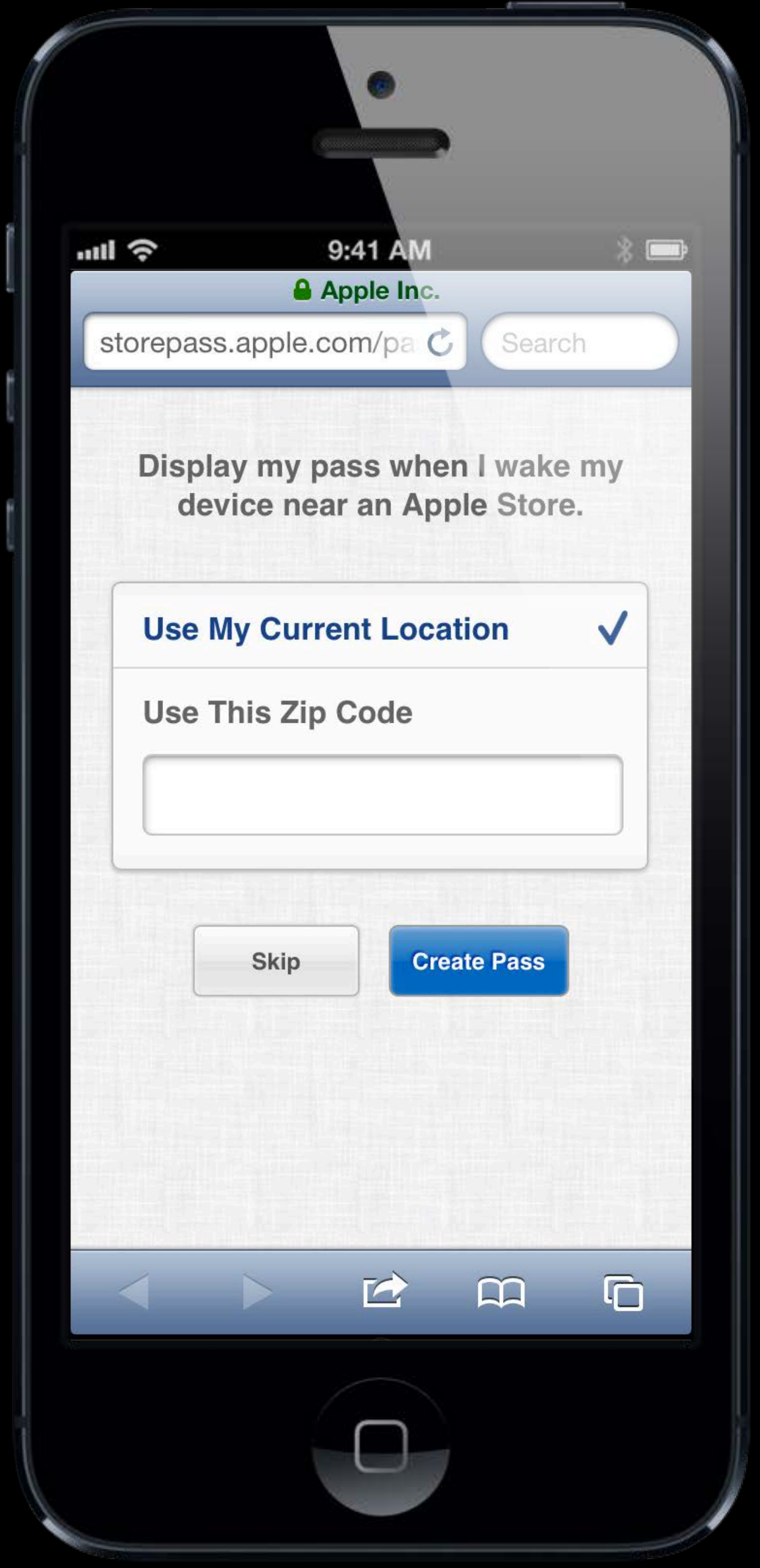
An Apple Store Gift Card for you
May 8, 2013, 9:18 AM

Enjoy your Apple TV
For your endless contributions to the team.

$110
Apple Store

Shop Online Store
Find a Retail Store

Add to Passbook



Display my pass when I wake my device near an Apple Store.

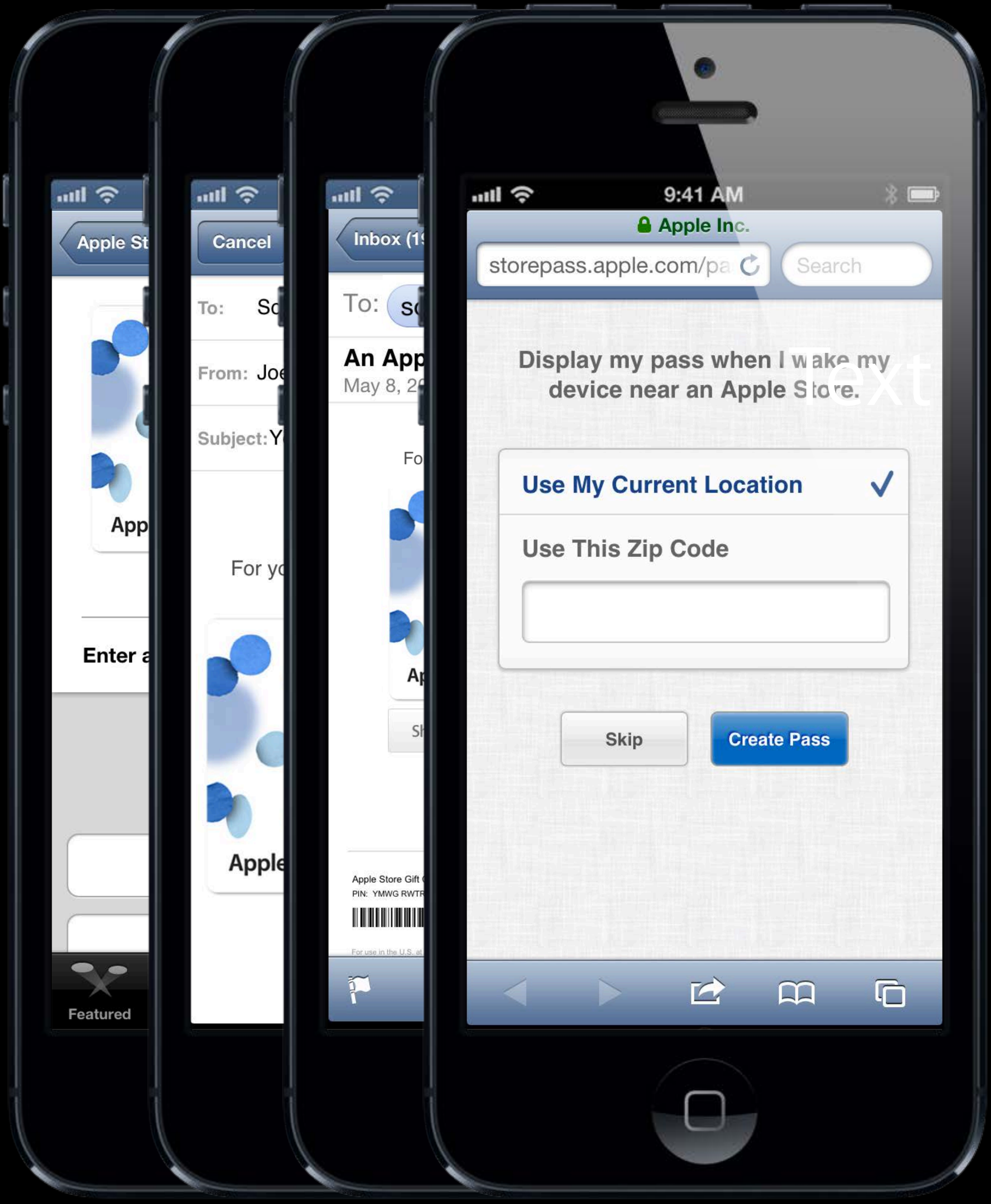
Use My Current Location ✓

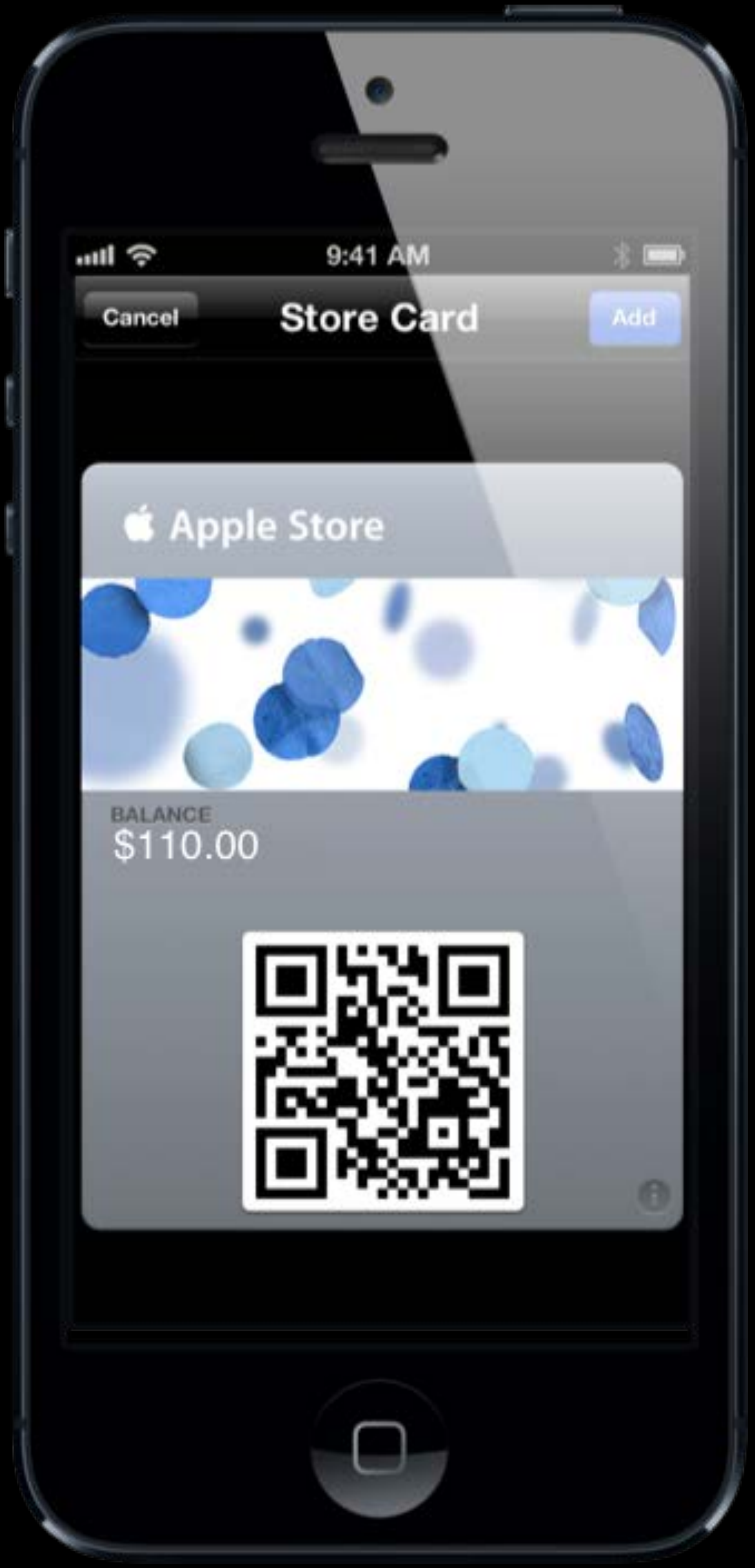
Use This Zip Code

Skip
Create Pass

Deliver the Pass

Step Five—user receives Apple Store gift card

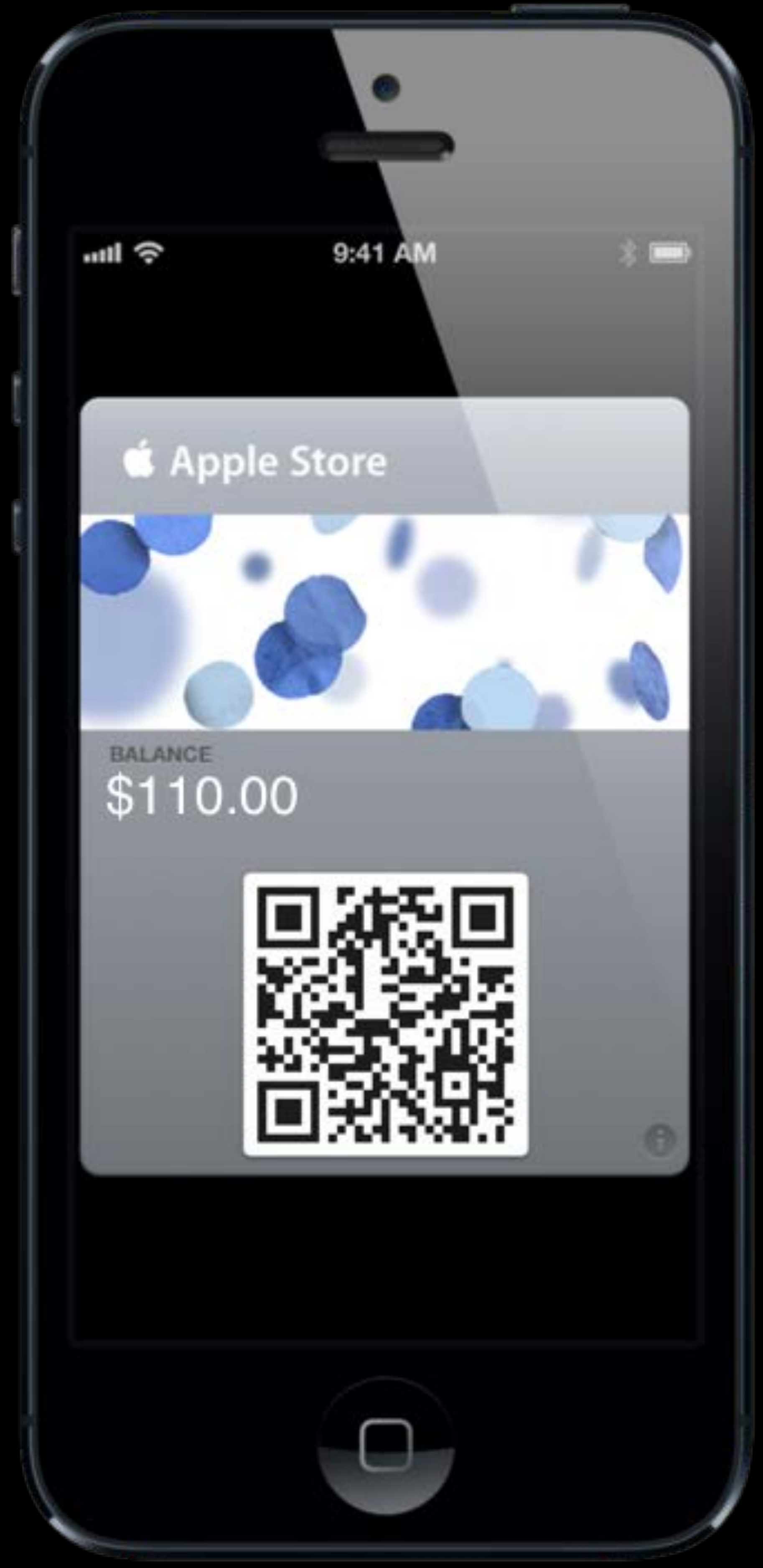




Deliver the Pass

Apple Store gift card goals

- Passbook should make it easier
- Existing avenues shouldn't get harder
- Companion app not required
- Integrate with existing systems

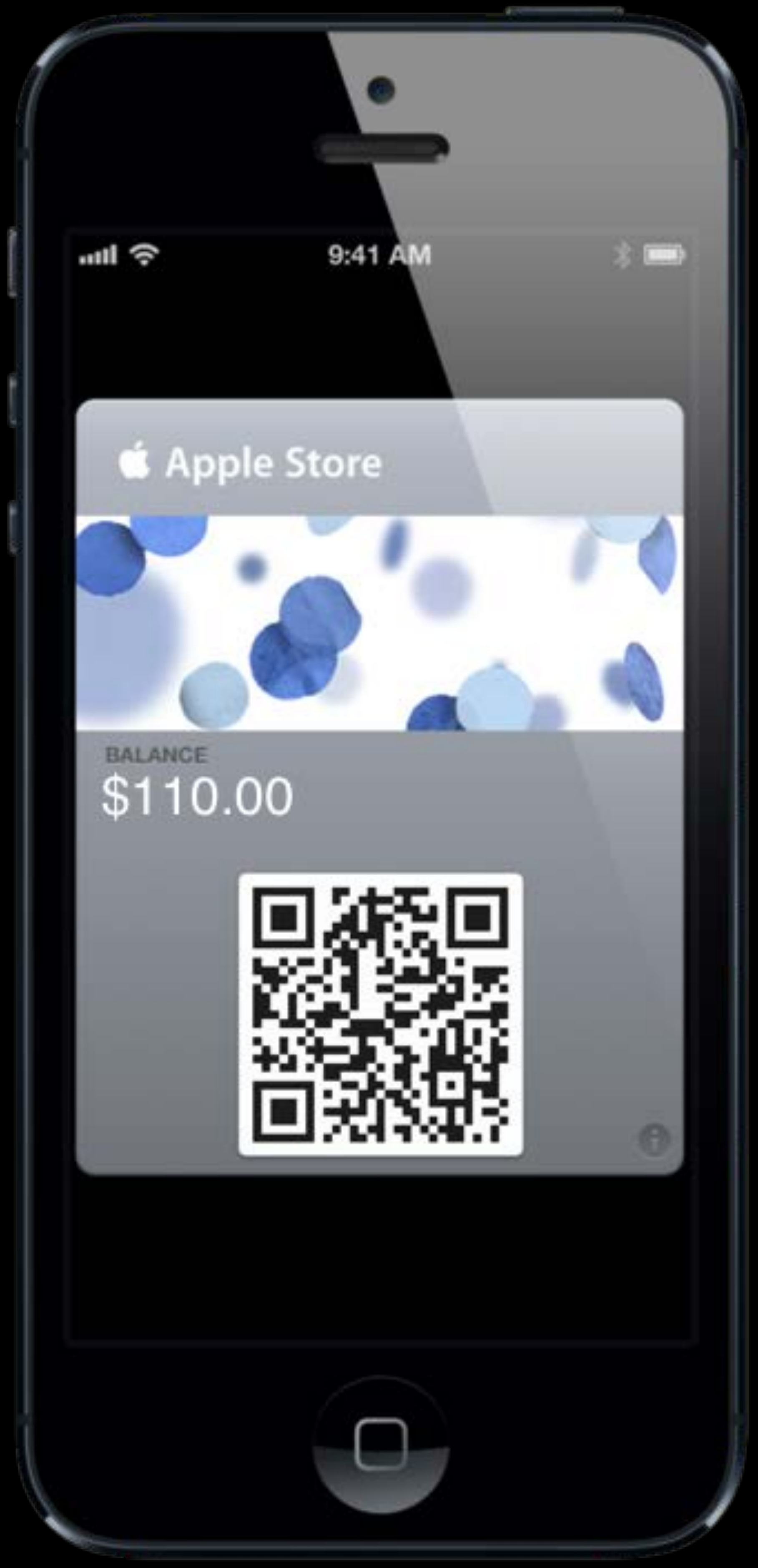


Use the Pass

Using Apple Store gift card on web or in the store

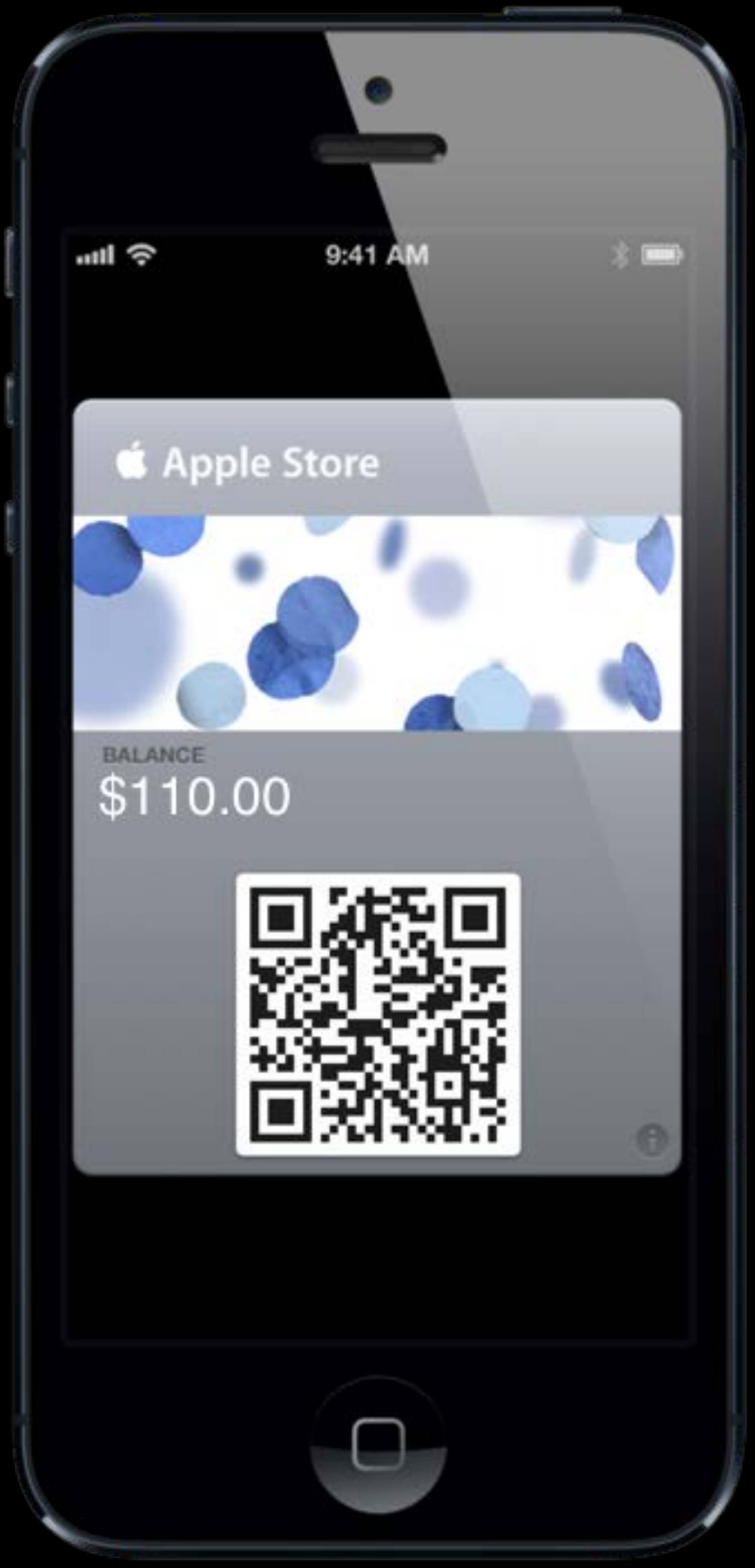
Use the Pass

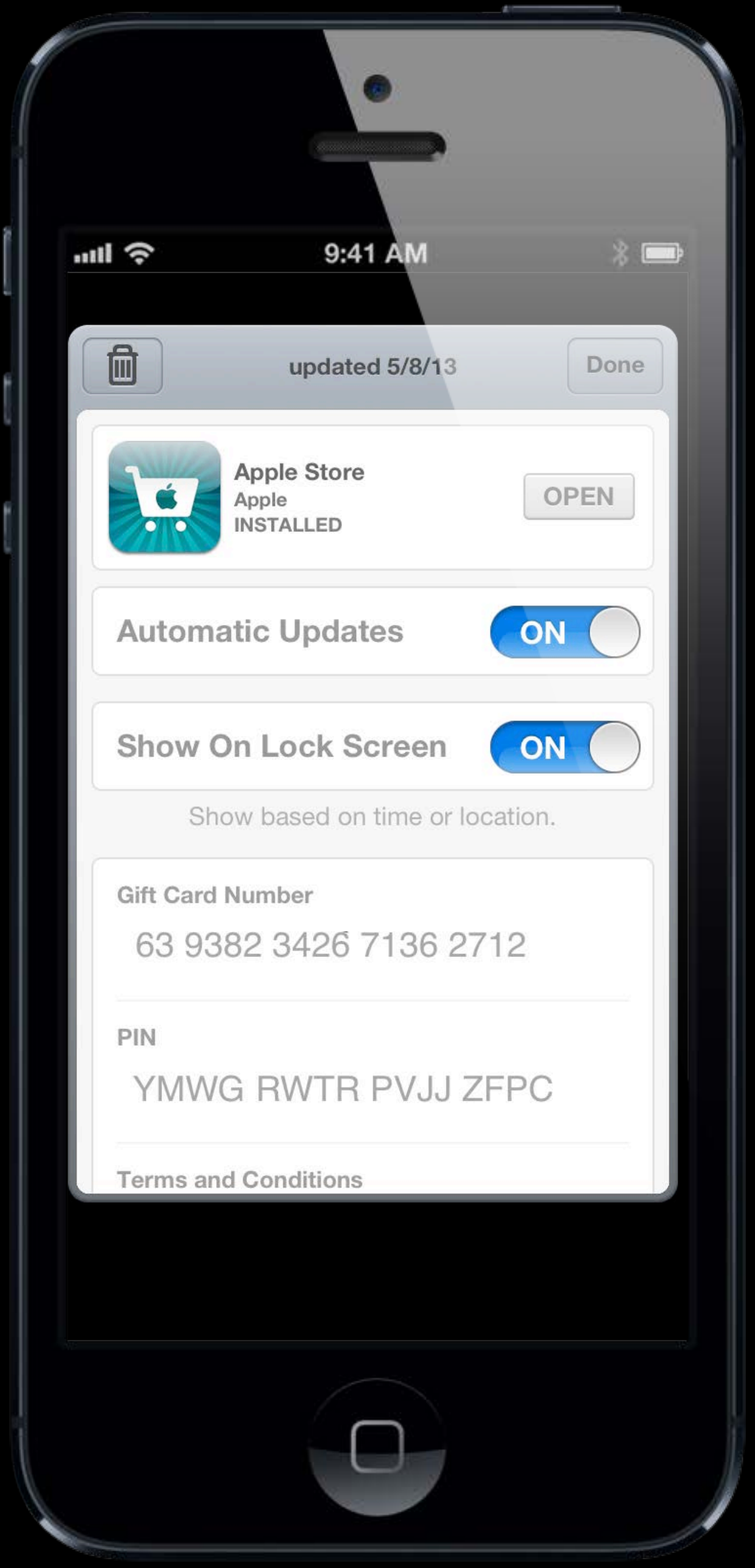
Purchase inside Apple retail store



Use the Pass

Purchase on the web or on the phone





updated 5/8/13

Apple Store
Apple
INSTALLED

Automatic Updates ON

Show On Lock Screen ON

Show based on time or location.

Gift Card Number
63 9382 3426 7136 2712

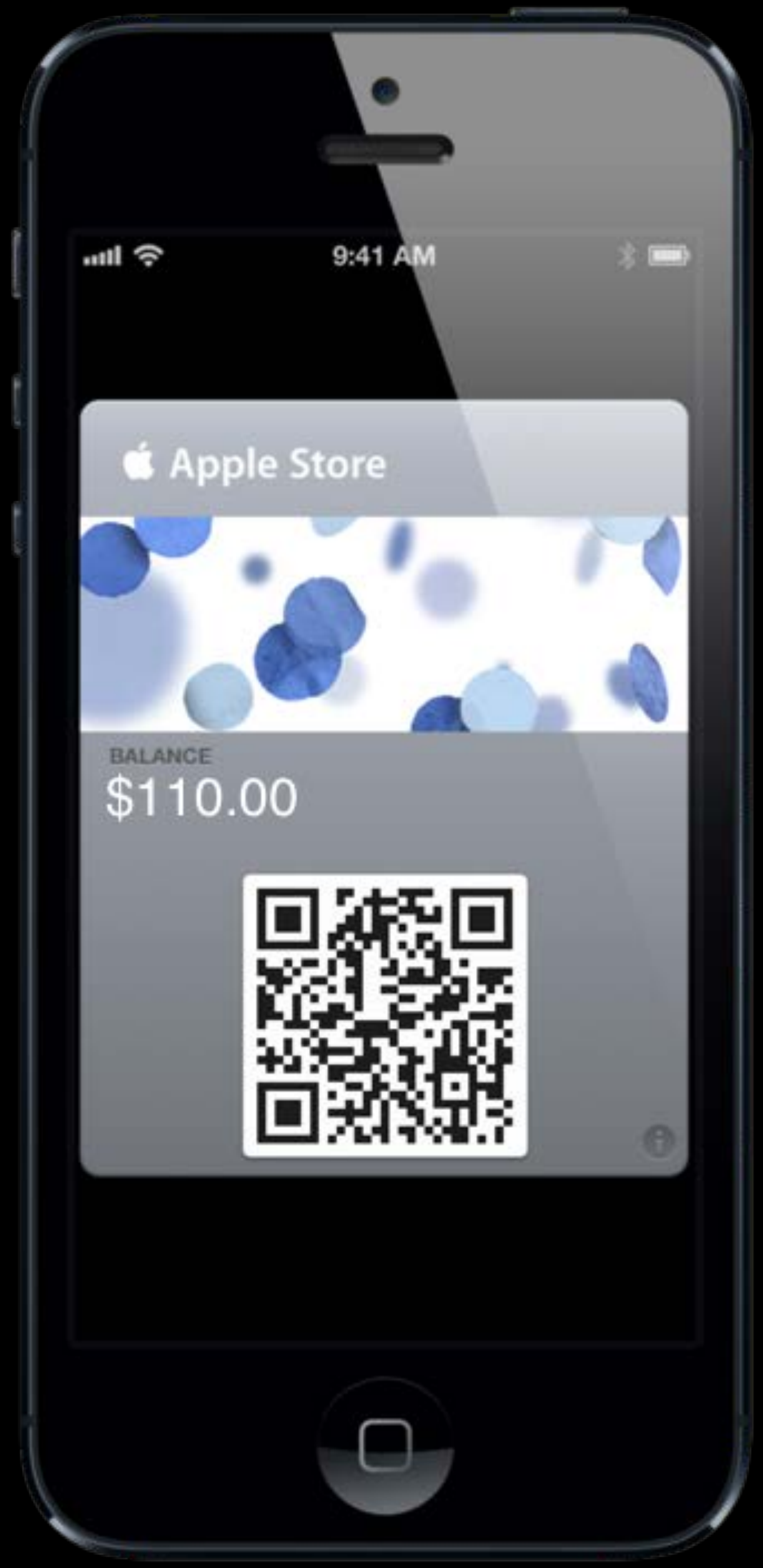
PIN
YMWG RWTR PVJJ ZFPC

Terms and Conditions

Use the Pass

Apple Store gift card goals

- Leverage existing systems
  - Retail store
    - Point of sale device
    - Optical scanners
  - Web
  - Phone
- Human factor



Human Factor

Our retail employees

- Retail employees
- Build a great point of sale user interface
- Which scanner do I use?
  - Laser scanner
  - Optical scanner

Barcodes

1-Dimensional

Wikipedia

Code 93

0 36000 29145 2

GTIN-12

5 901234 123457 >

EAN-13

Barcodes

1-Dimensional

Wikipedia

Code 93

0 36000 29145 2

GTIN-12

5 901234 123457 >

EAN-13

2-Dimensional

PDF-417

Aztec

QR Code

Human Factor

Our retail employees

- Target user-experience consistency

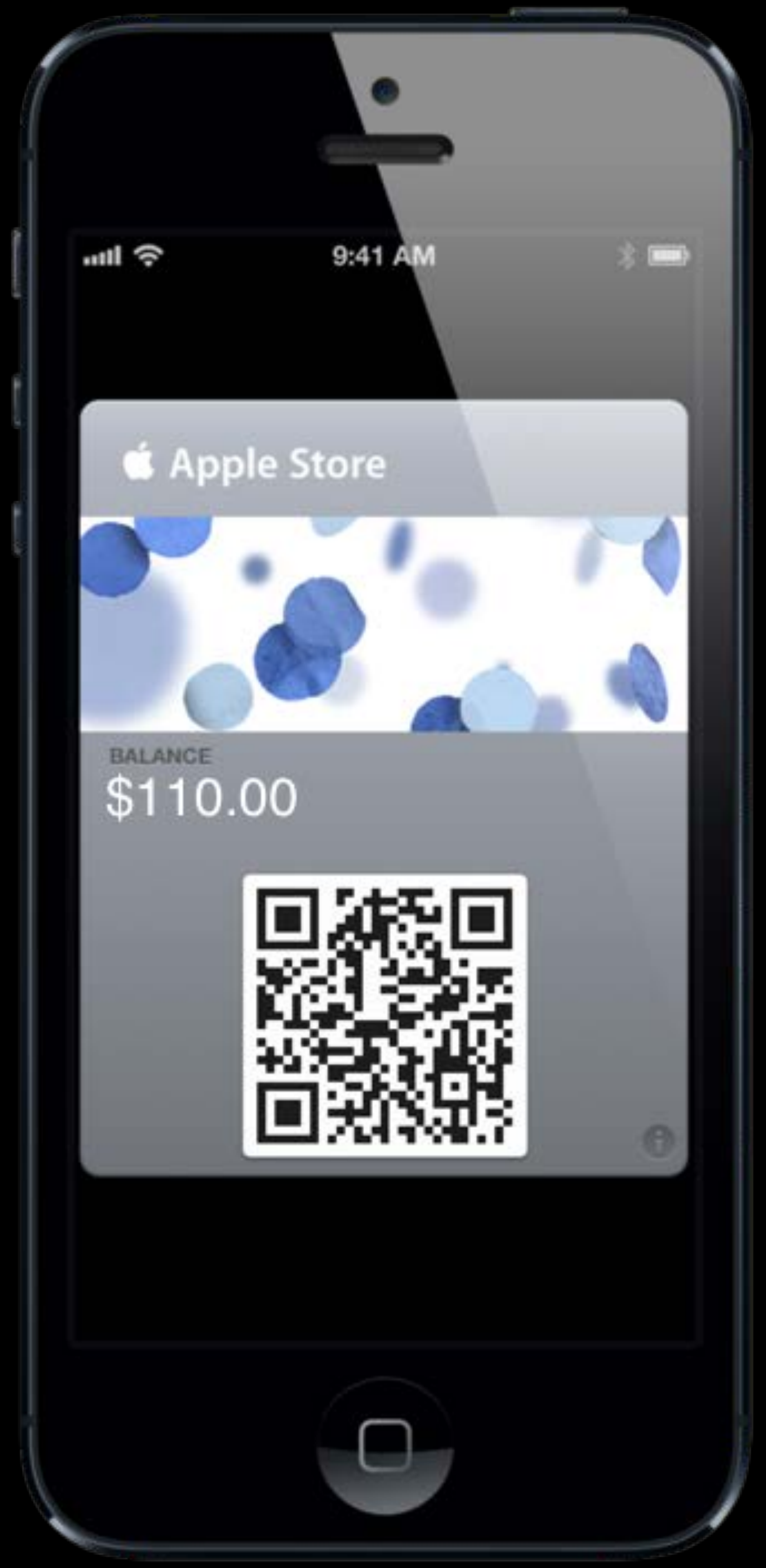
Update the Pass

Updating Apple Store gift card

Feedback Loop

Keeping our passes alive

- Once a redemption occurs, update the pass
- Feeds back into human factor
- Use Apple Push Notification service



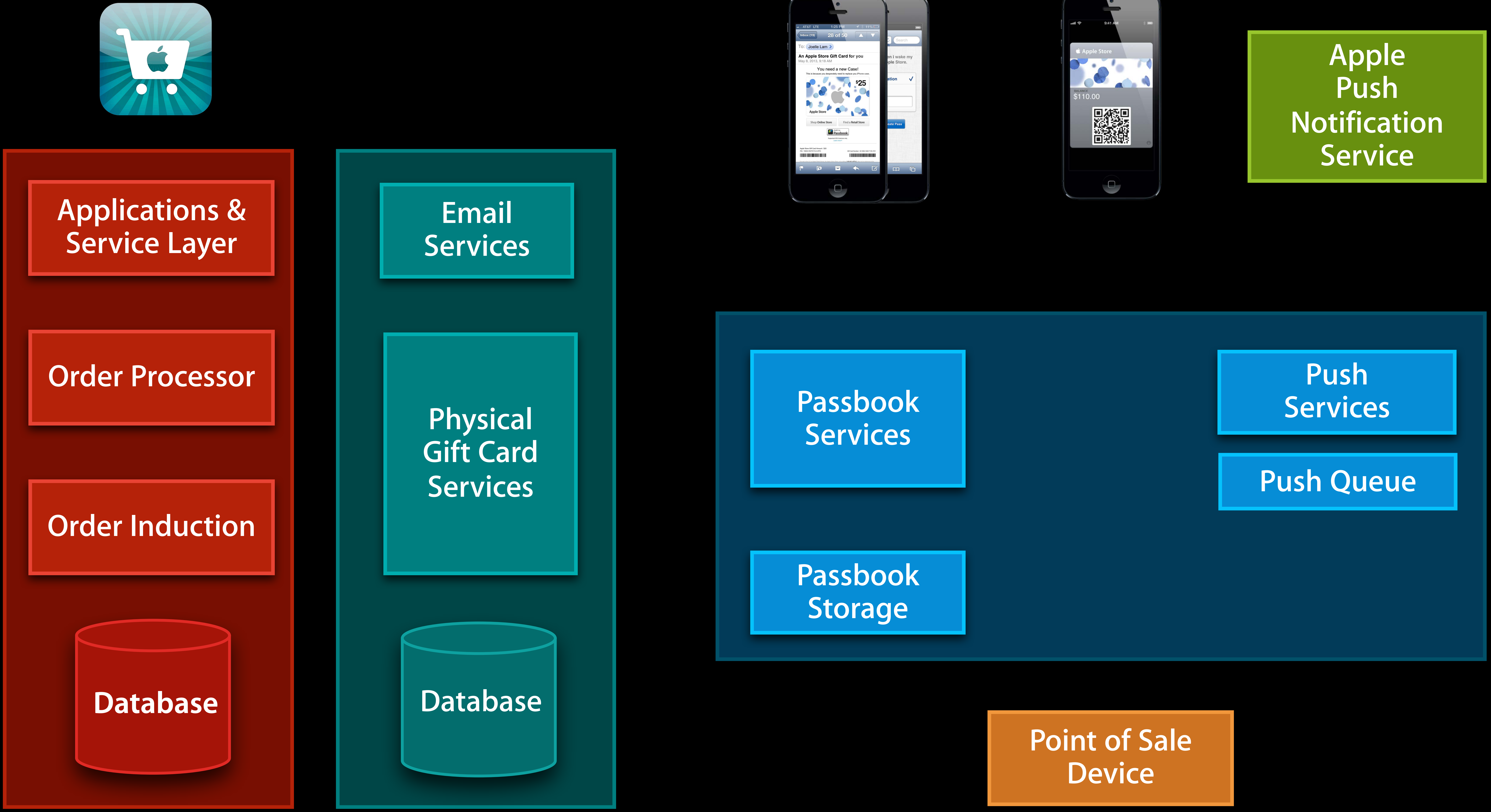
Apple Store Gift Card

Lifecycle review

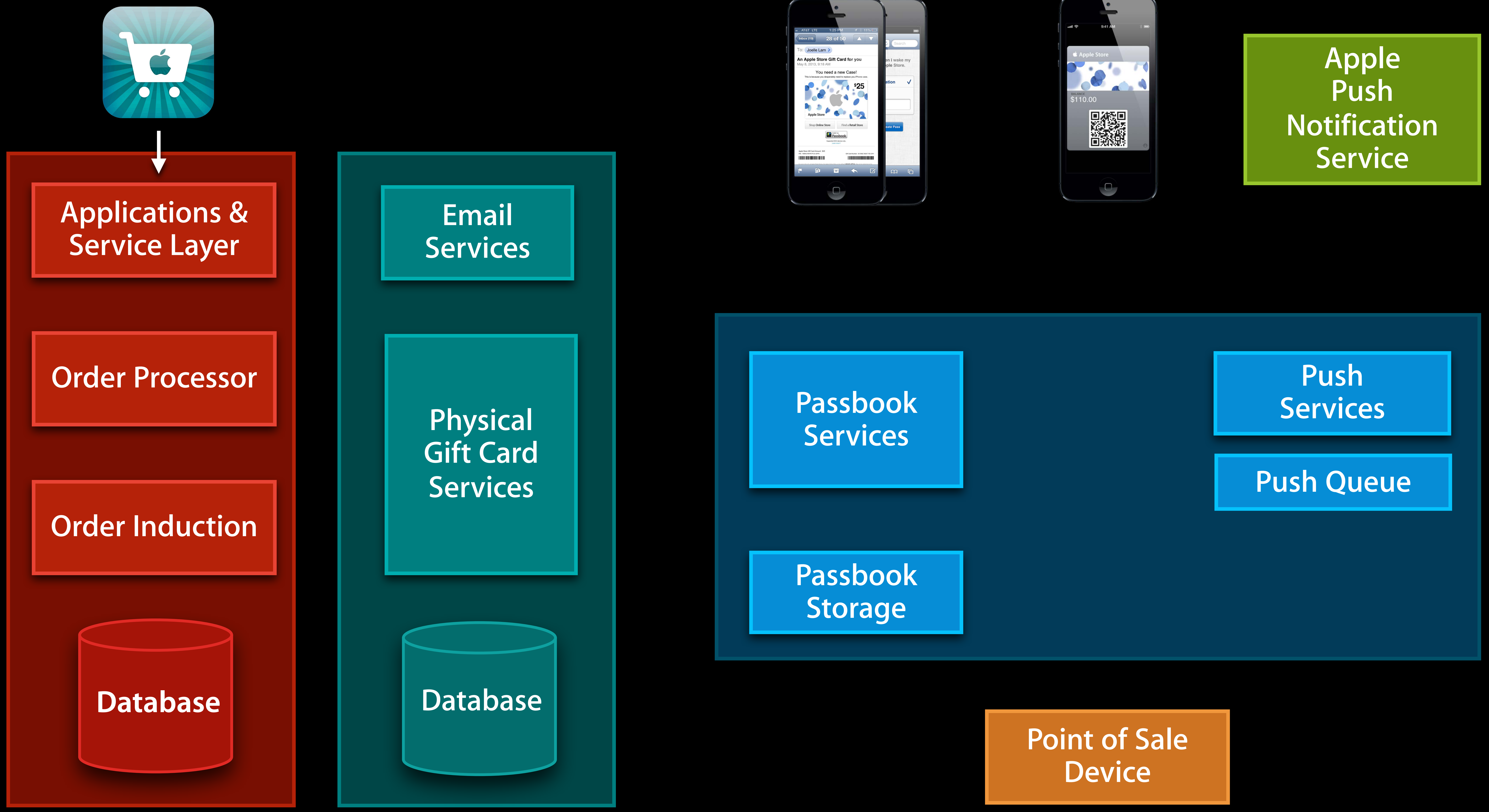
Leveraging Your Existing Systems

Abstraction 101

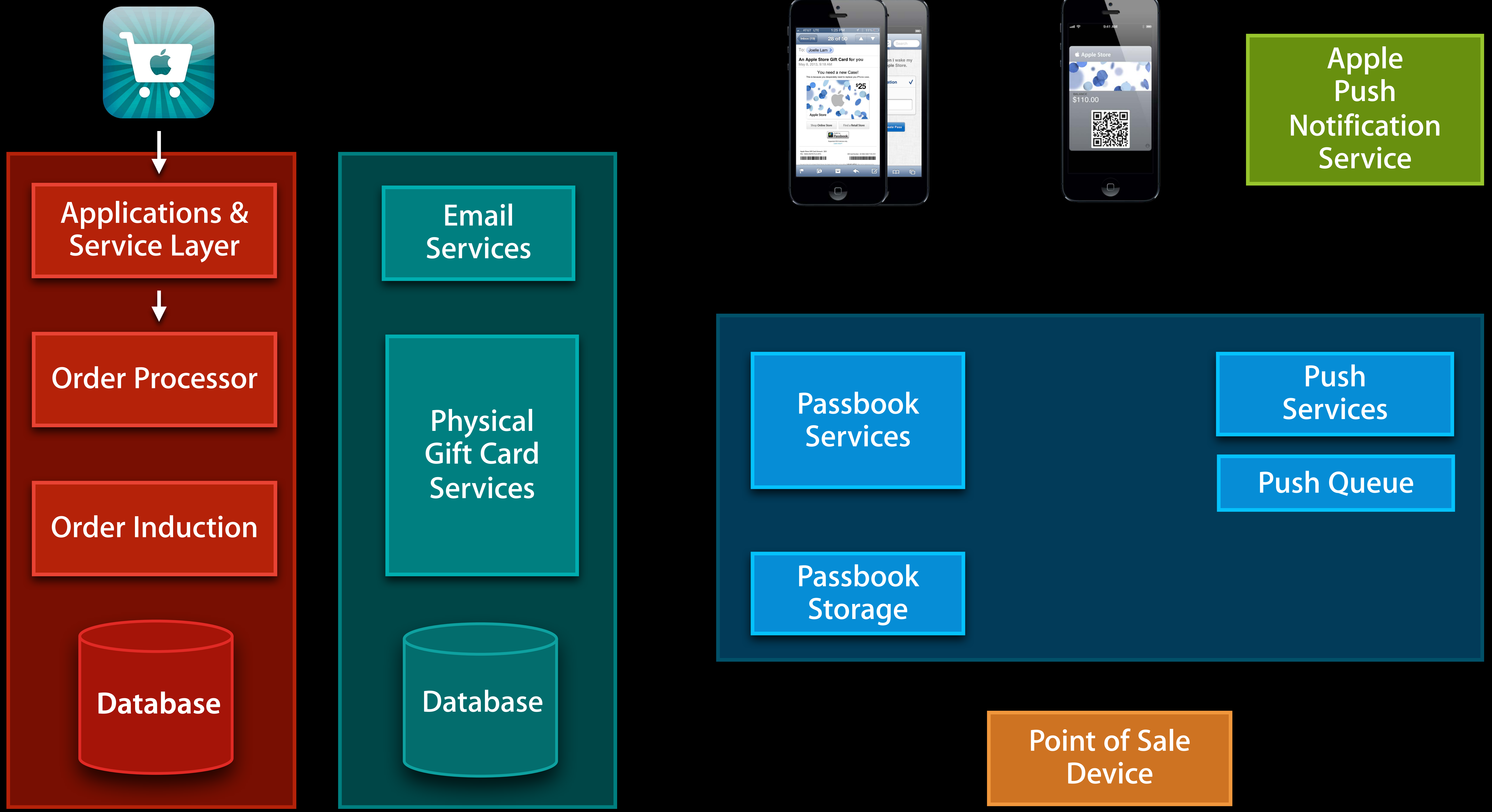
Systems Diagram



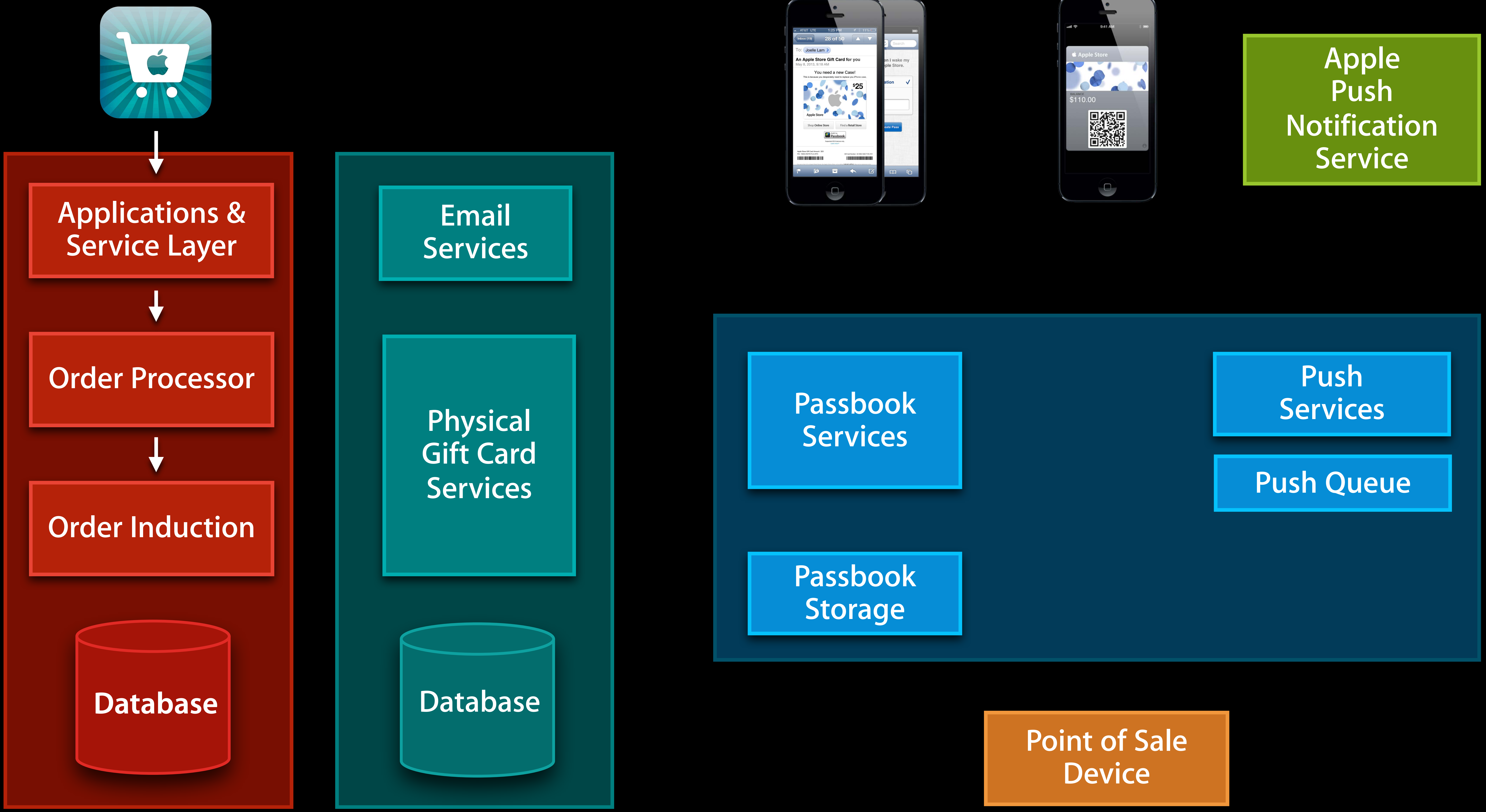
Systems Diagram



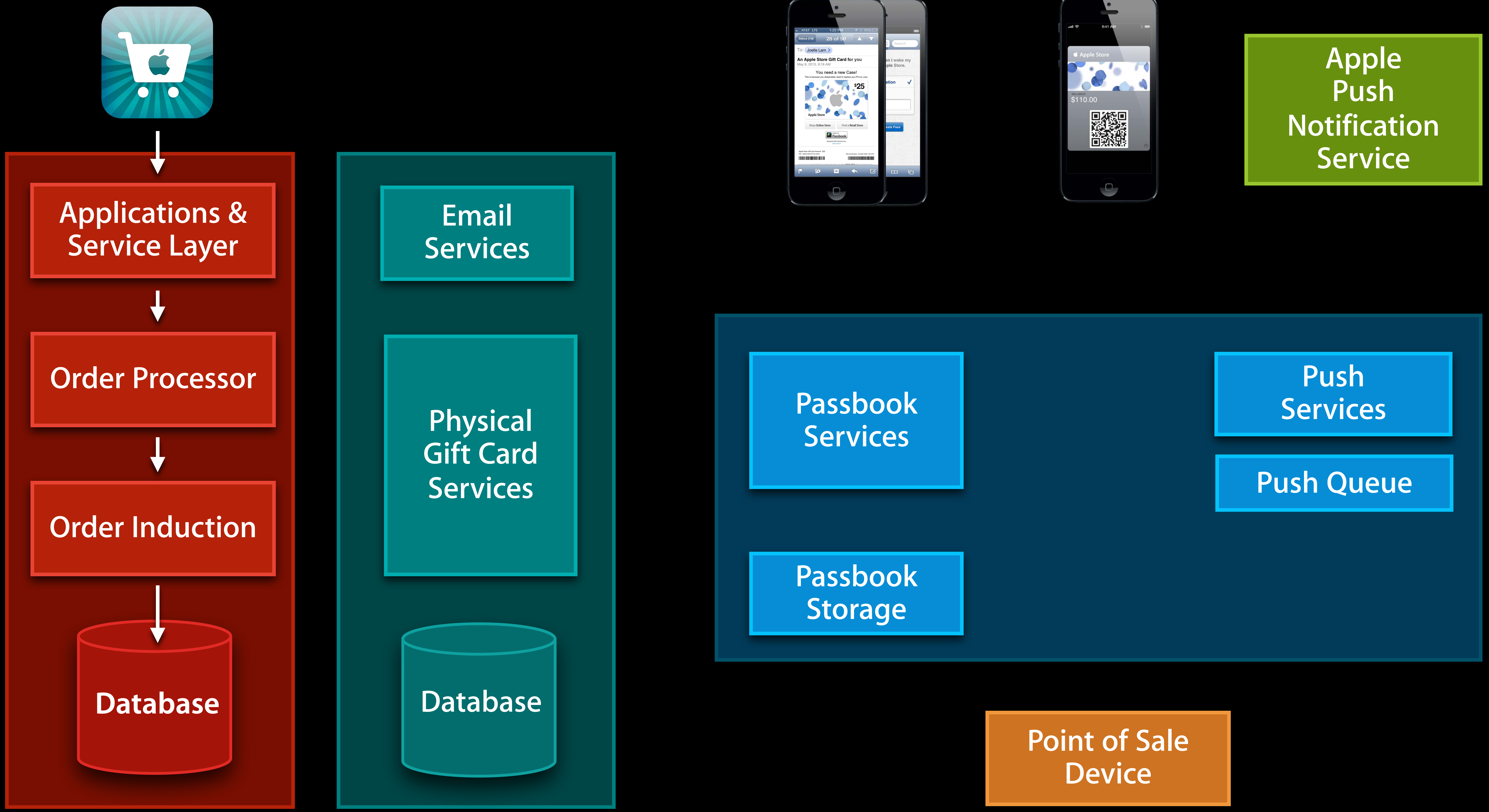
Systems Diagram



Systems Diagram



Systems Diagram



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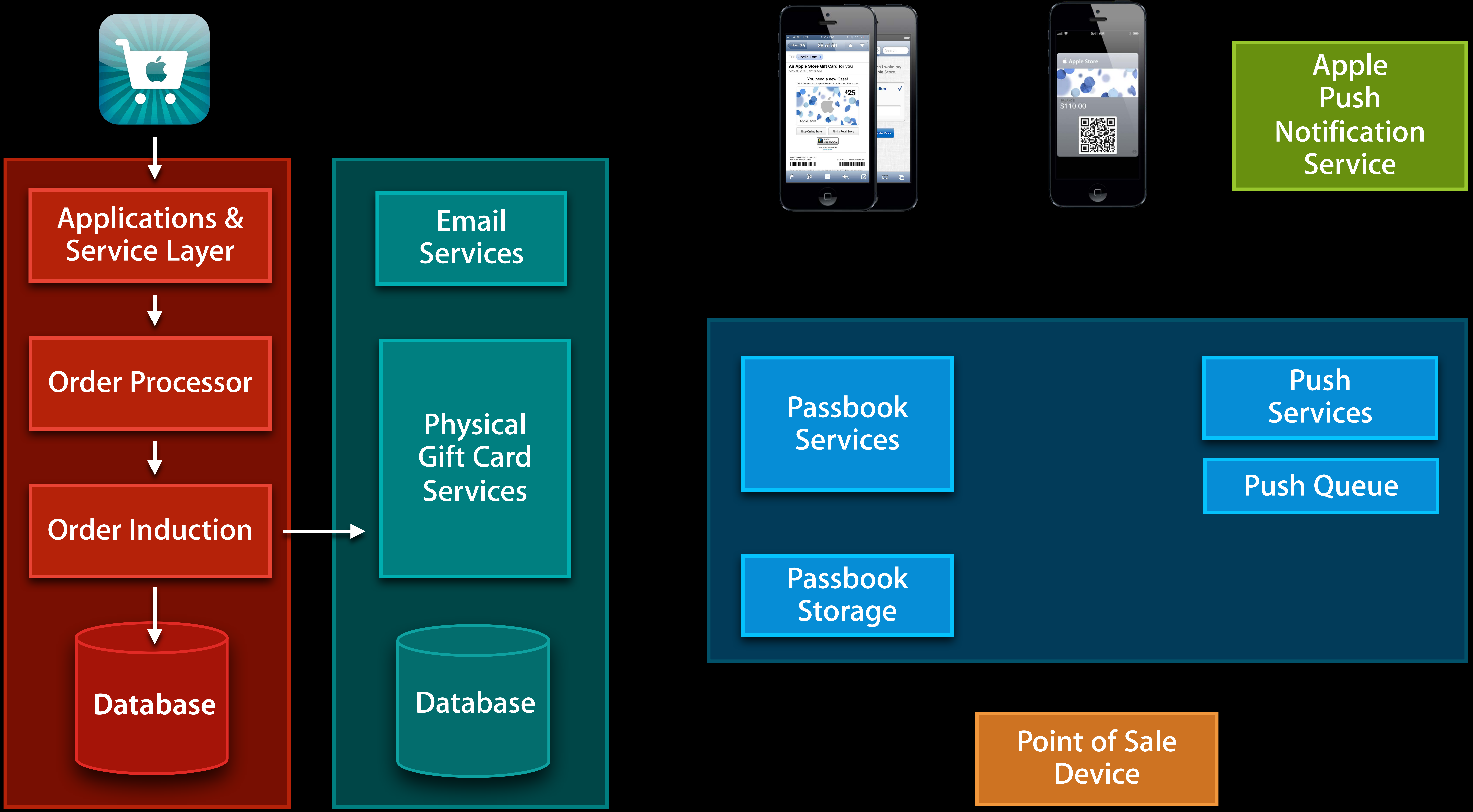

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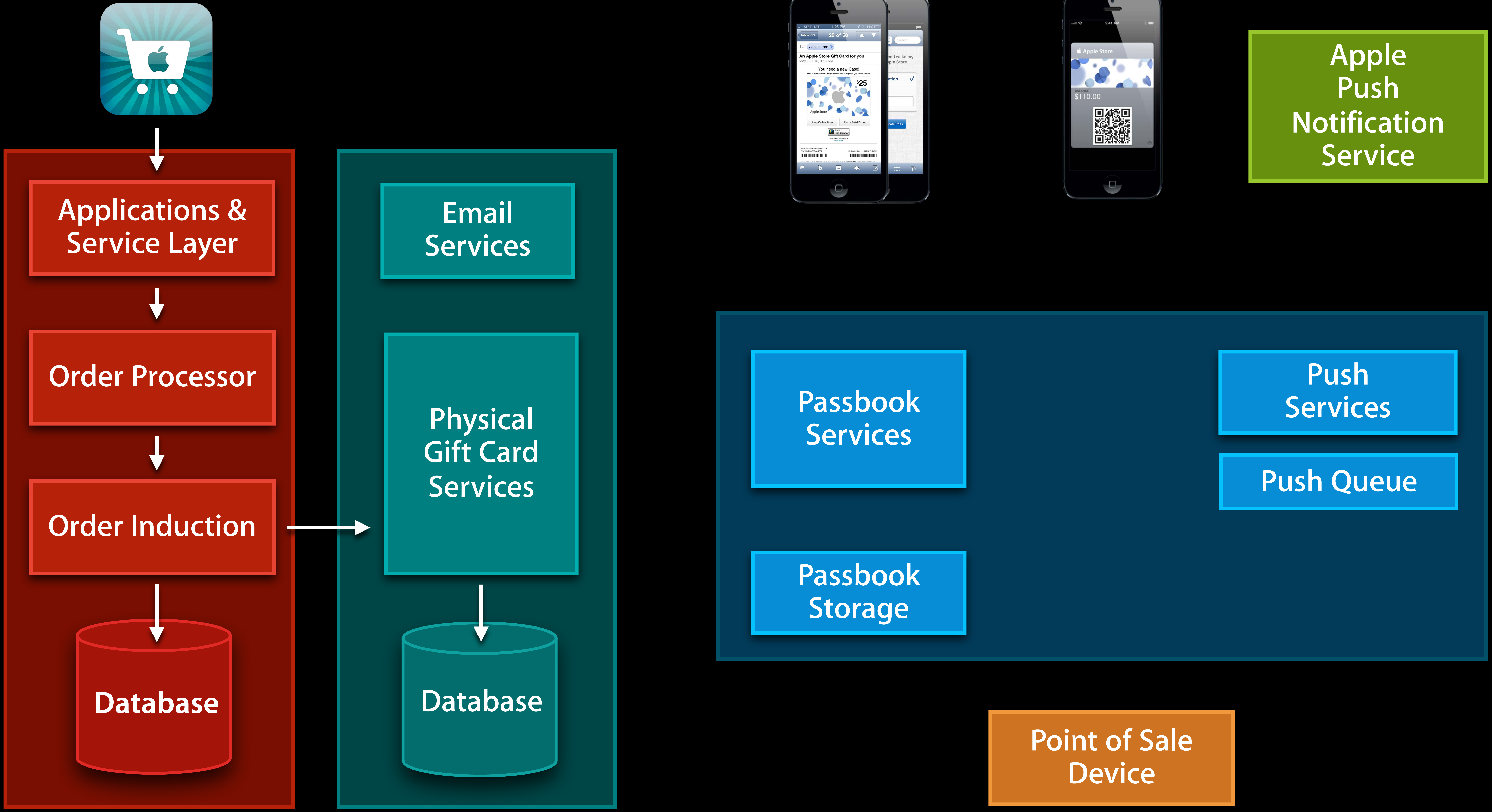

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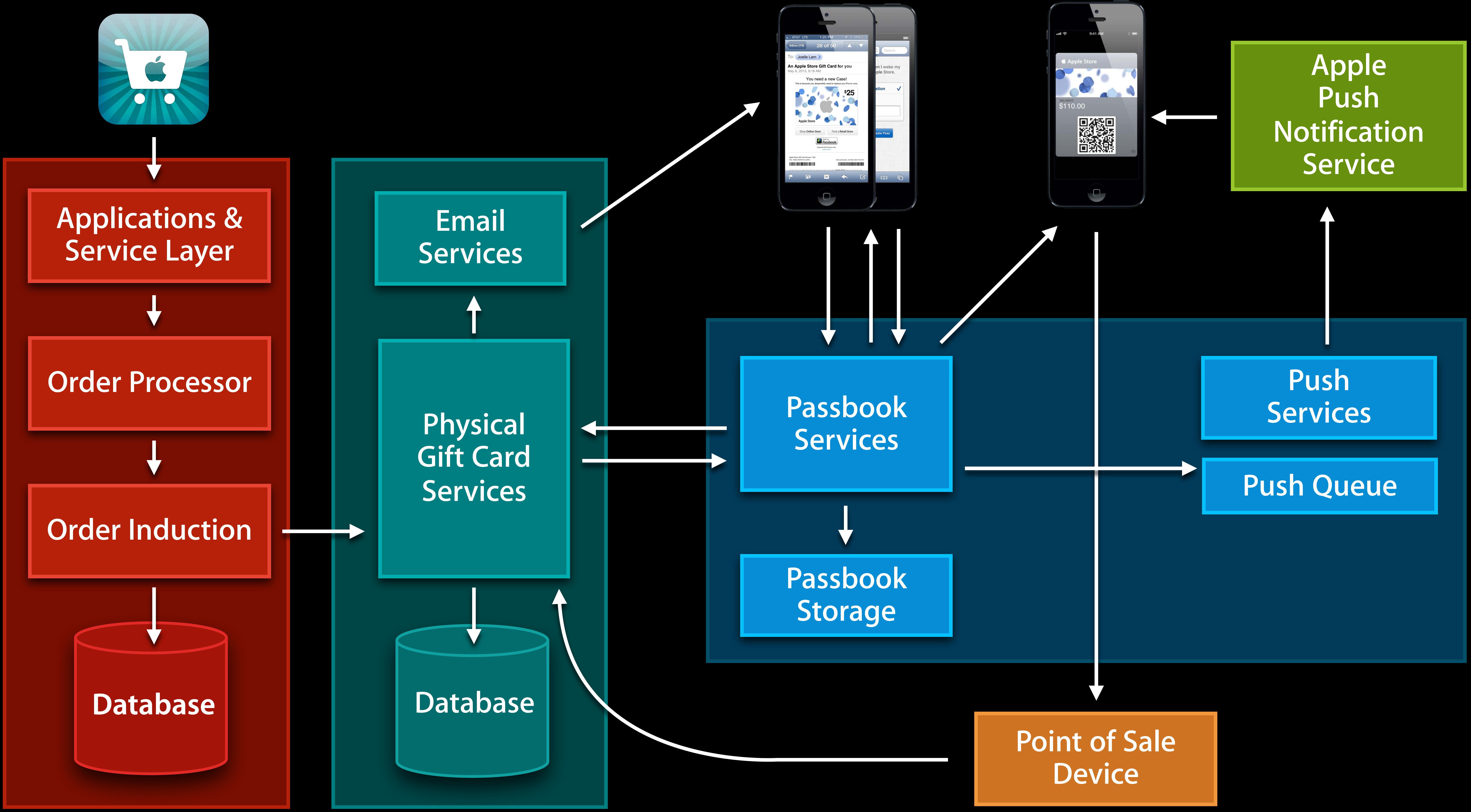

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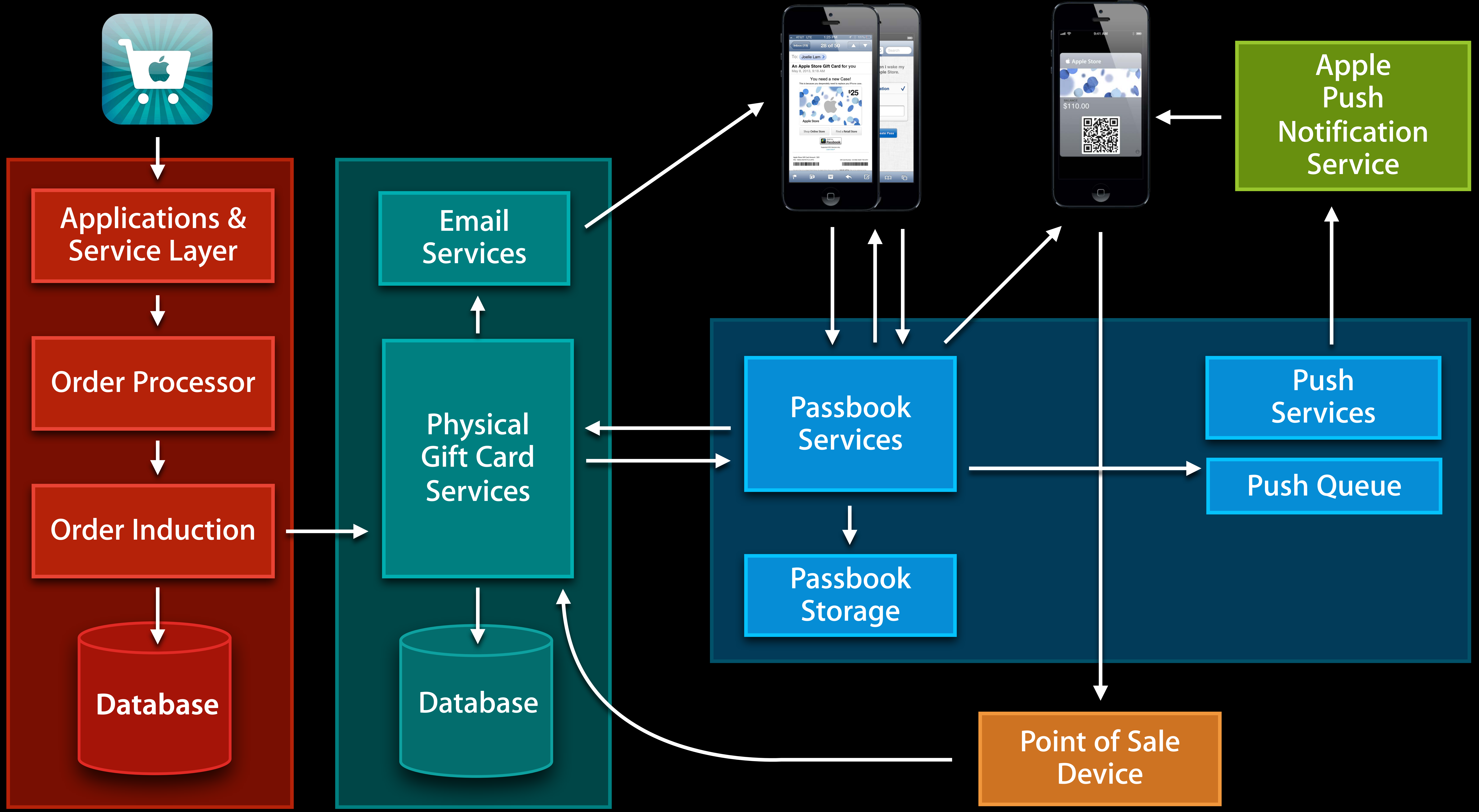
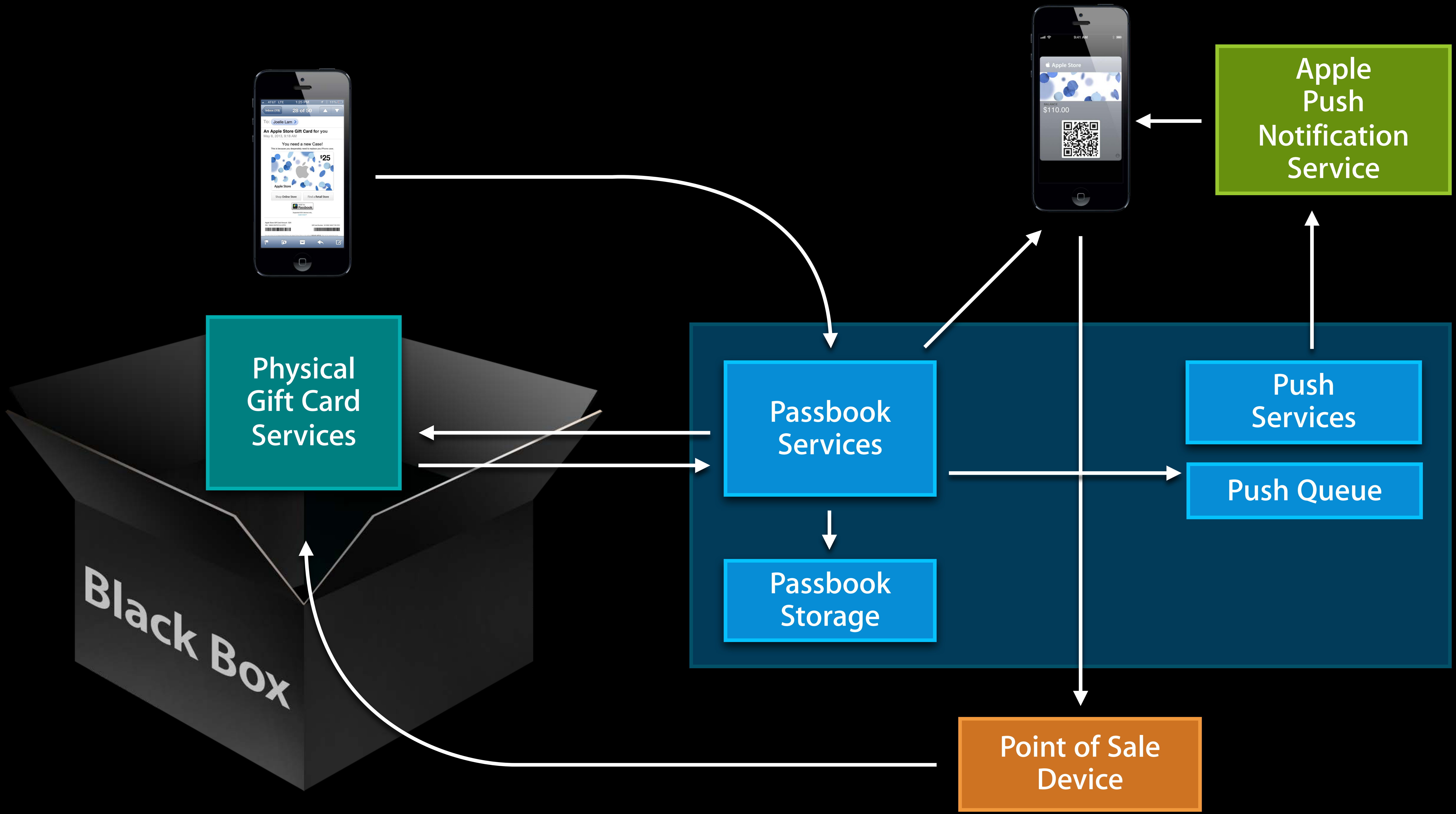
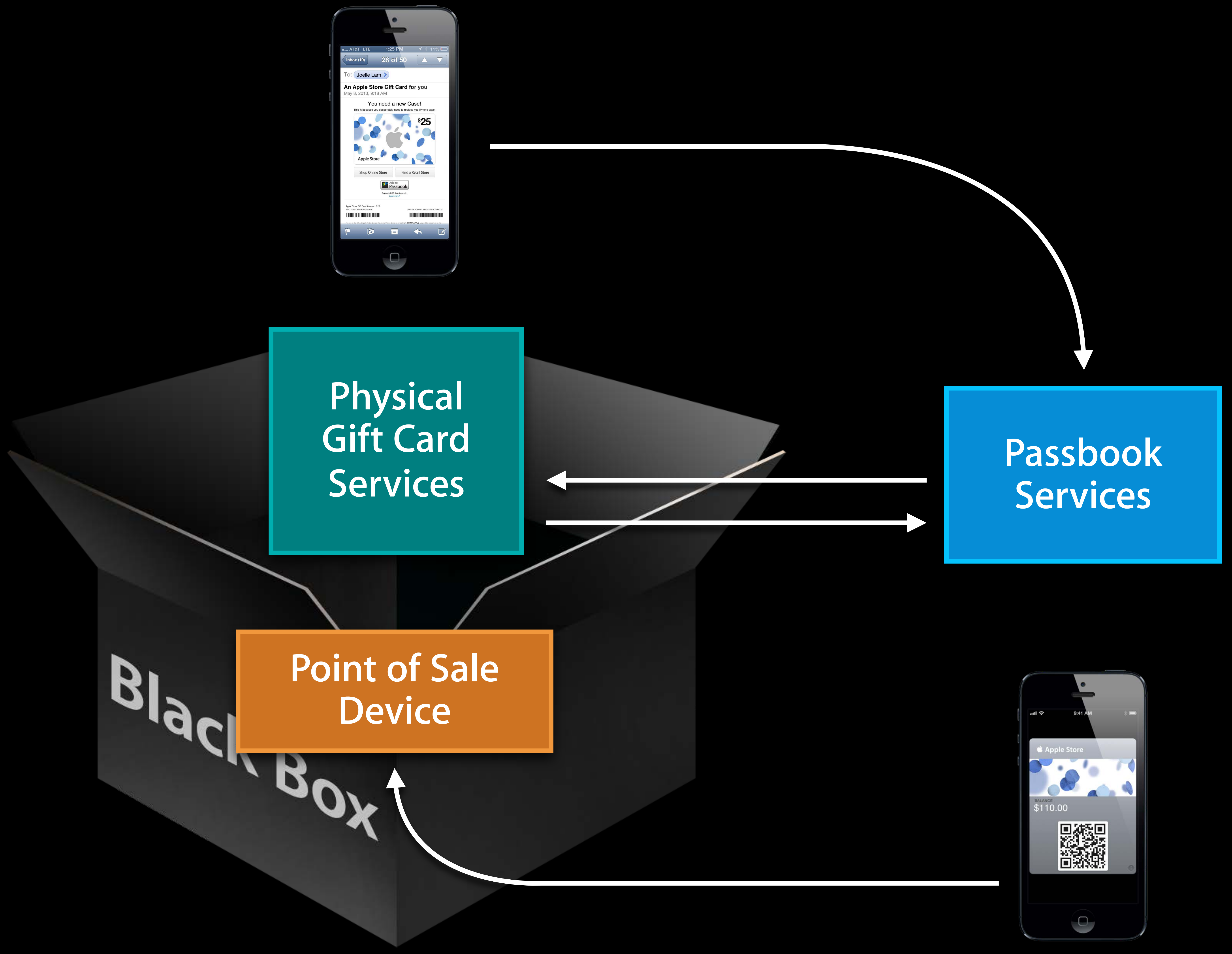


Push to the Black Box



Identify the Minimum Interface



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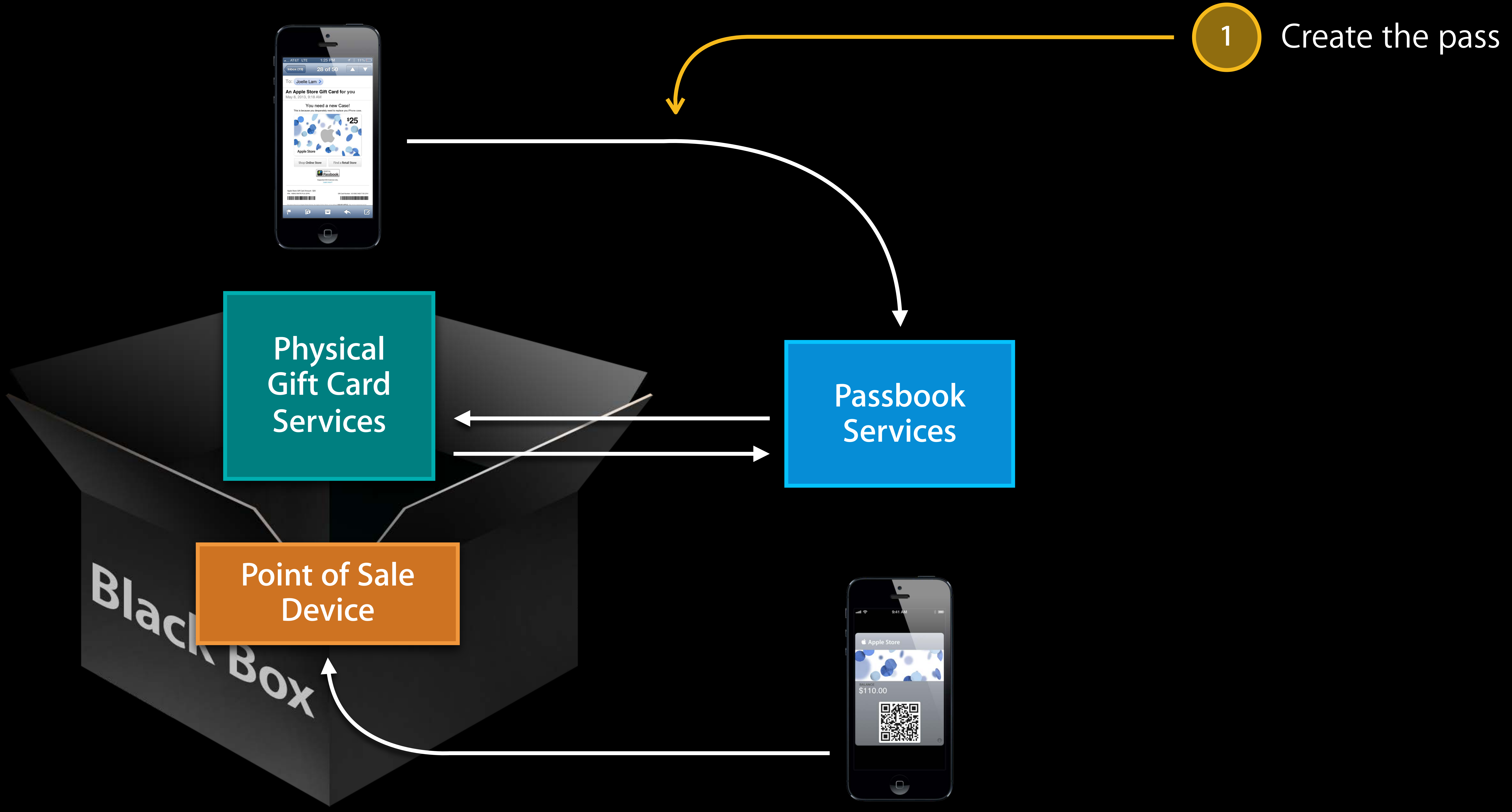

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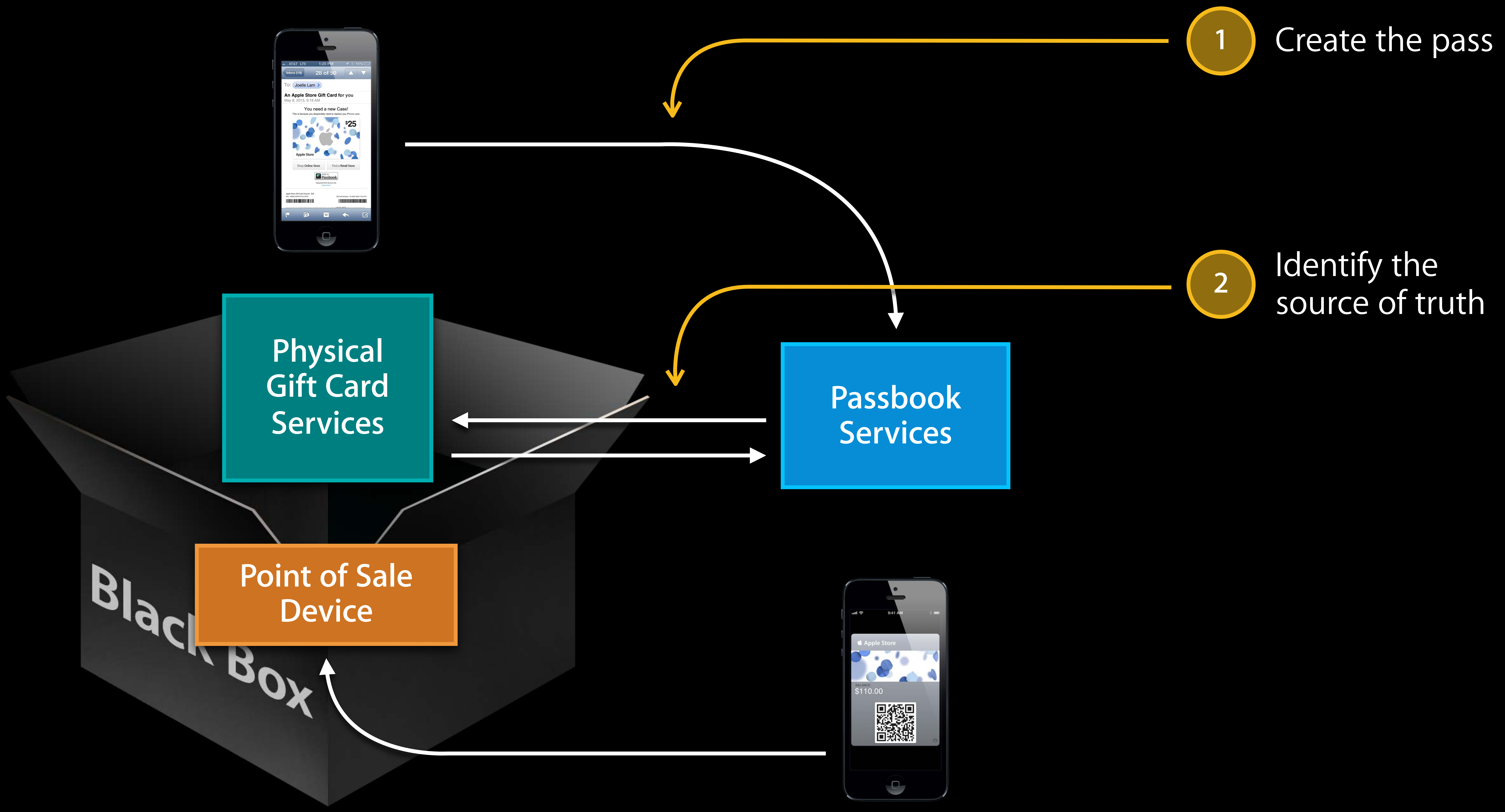
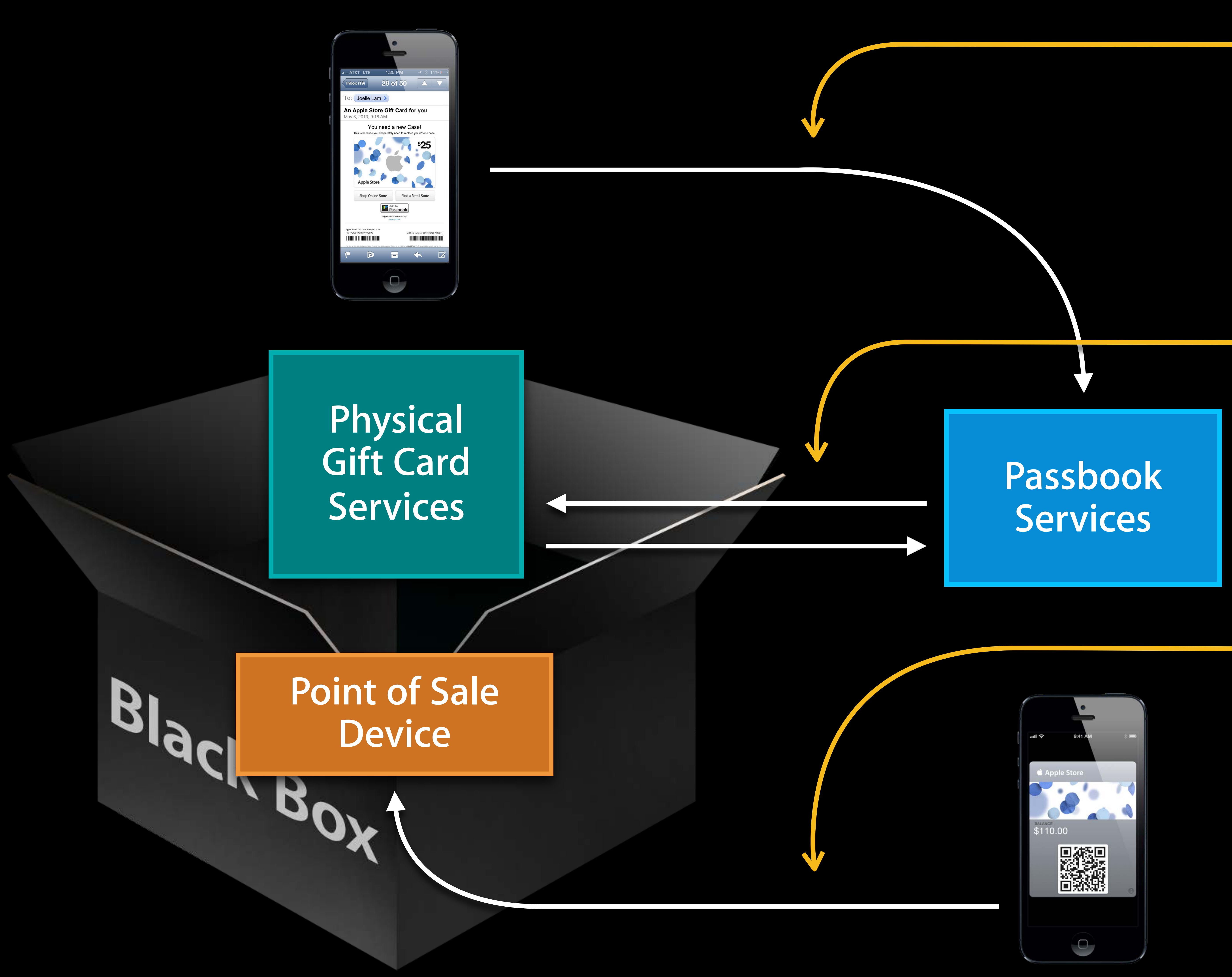


Identify the Minimum Interface

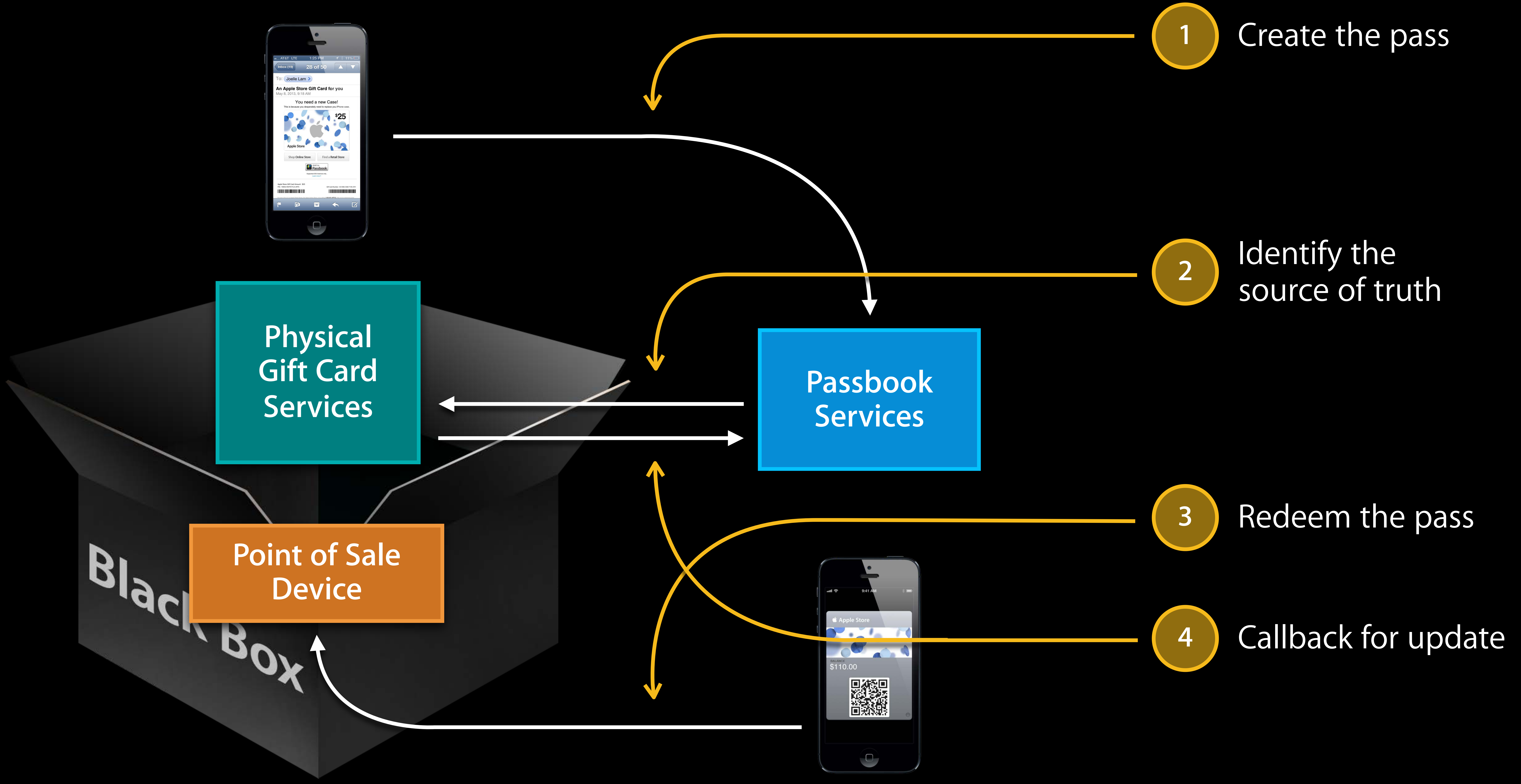


1 Create the pass

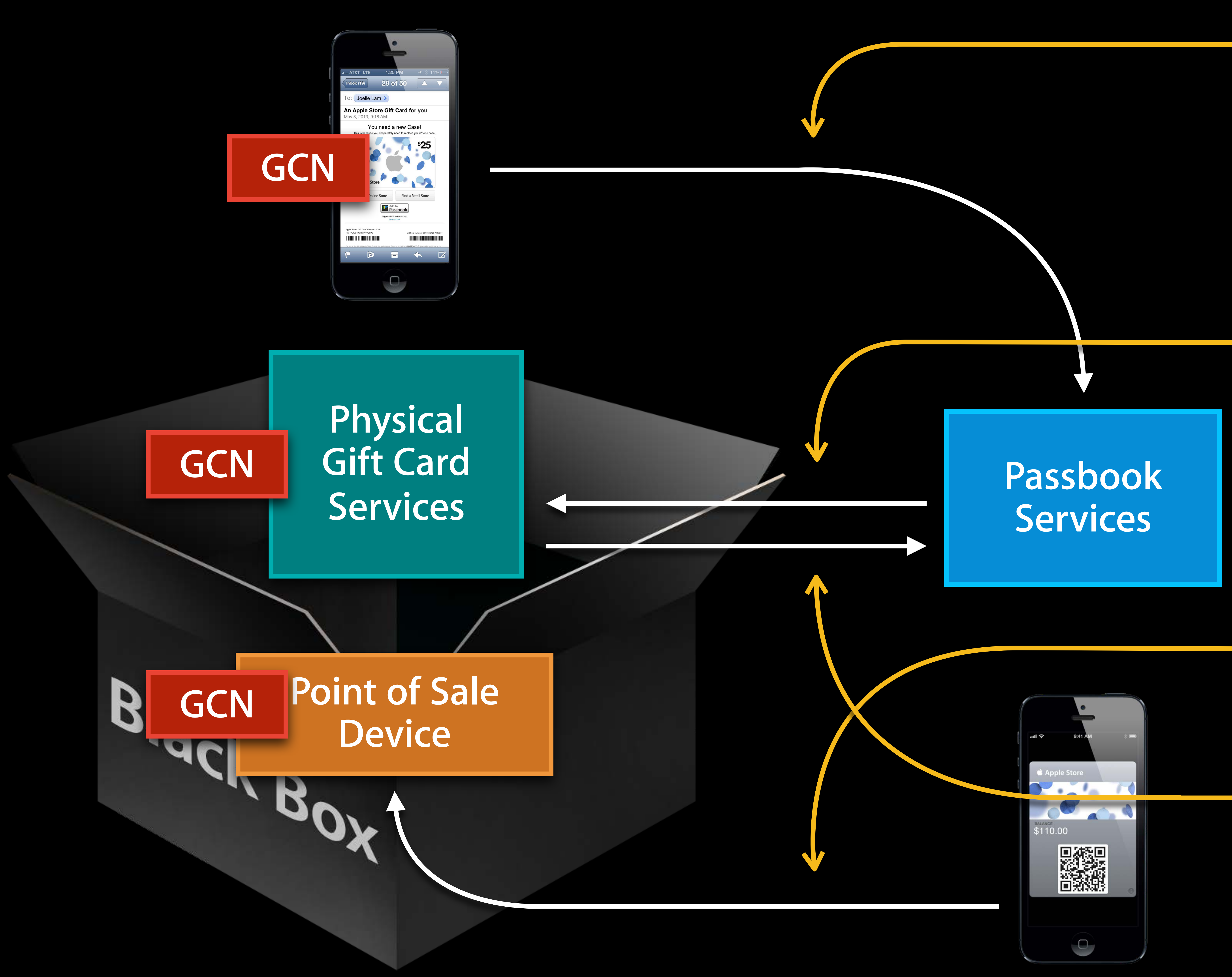
2 Identify the source of truth

3 Redeem the pass

Identify the Minimum Interface



Common Currency



1 Create the pass

2 Identify the source of truth

3 Redeem the pass

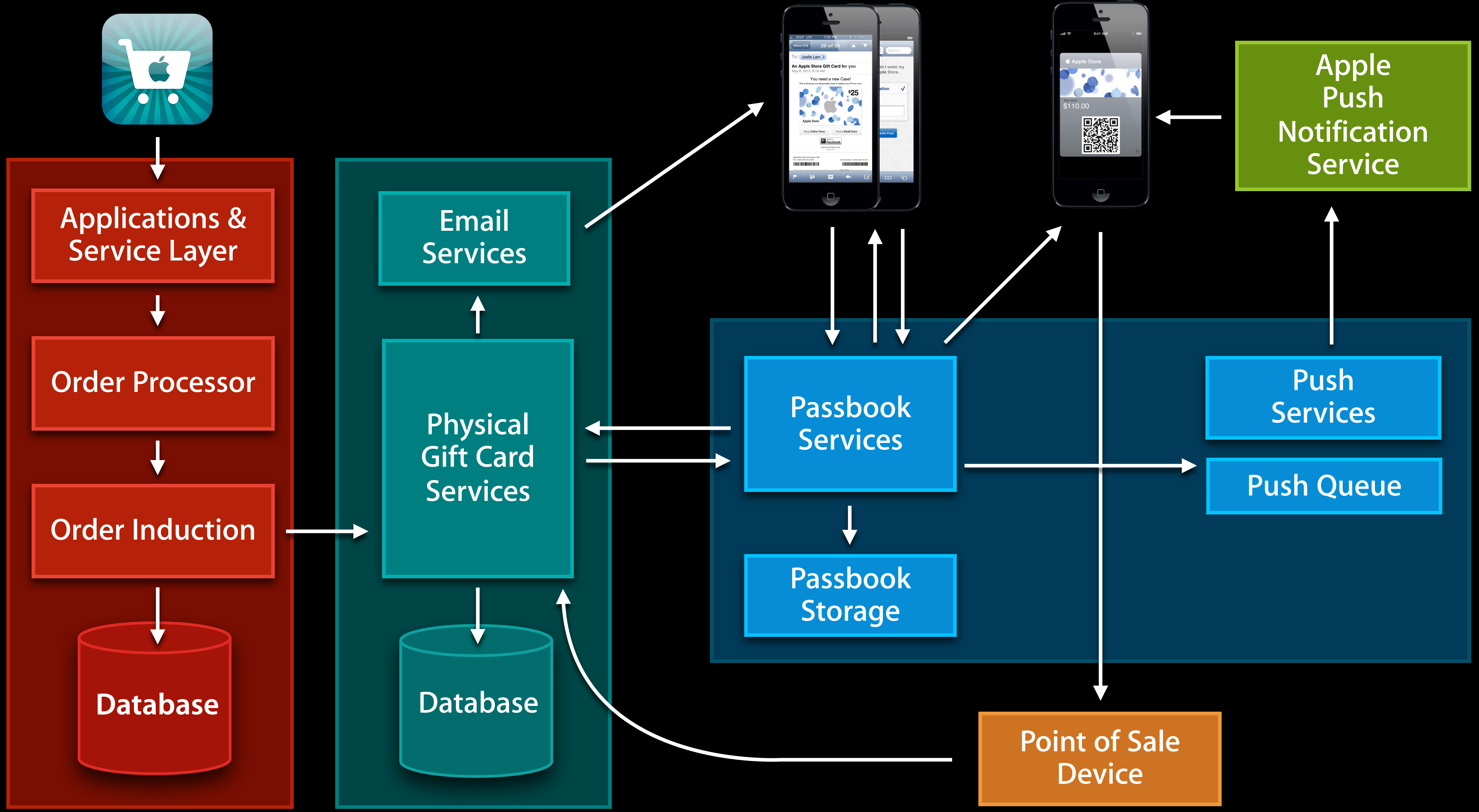
4 Callback for update

Common Currency

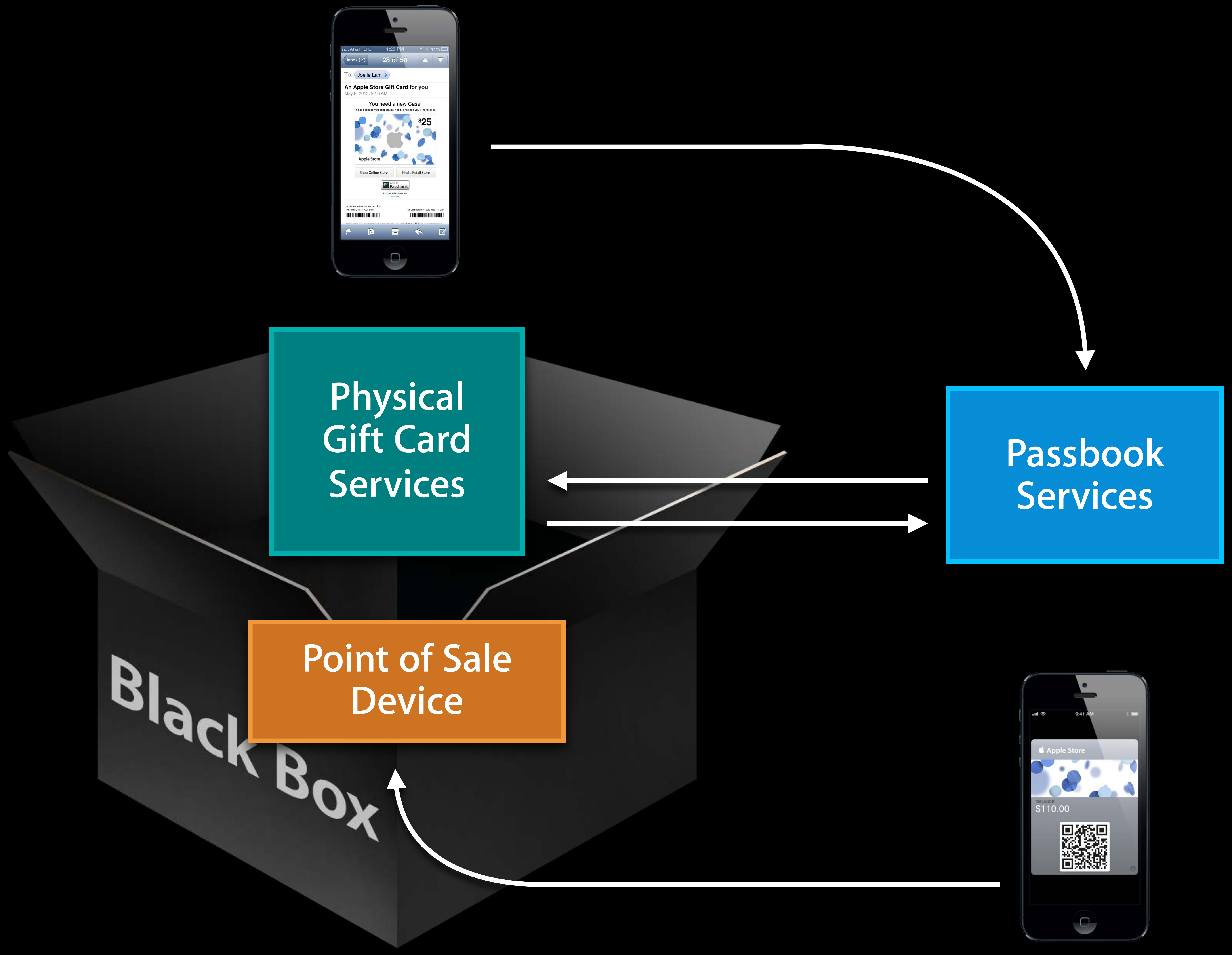
Value known by all interfacing systems

- Gift card number
- Club card number
- Insurance policy number
- Order number
- Event ID
- Event ID with a customer ID

Systems Diagram



Identify the Minimum Interface



1 Create the pass

2 Identify the source of truth

3 Redeem the pass

4 Callback for update

Determining Complexity

A way to anticipate the level of effort

Facets of Complexity

- Value
- Uniqueness
- Static vs. Dynamic
- Scale
- Systems Integration

Mountain Trail Signs

BASIC
INTERMEDIATE
ADVANCED

Value

Newspaper Coupon

BASIC

Movie Ticket

INTERMEDIATE

Boarding Passes

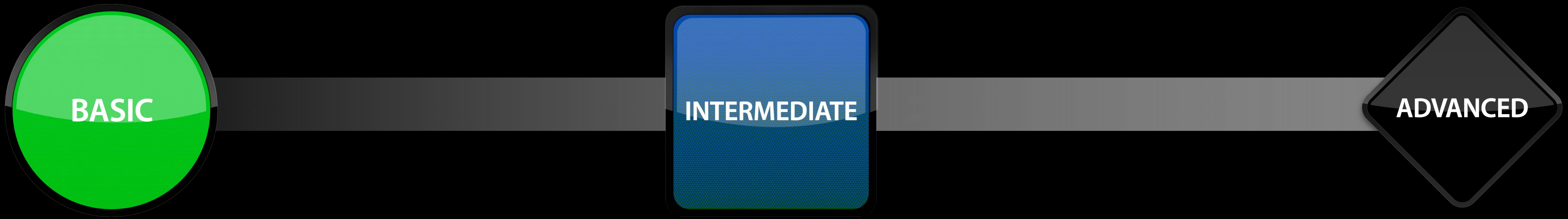
ADVANCED

Value

Newspaper Coupon

Movie Ticket

Boarding Passes

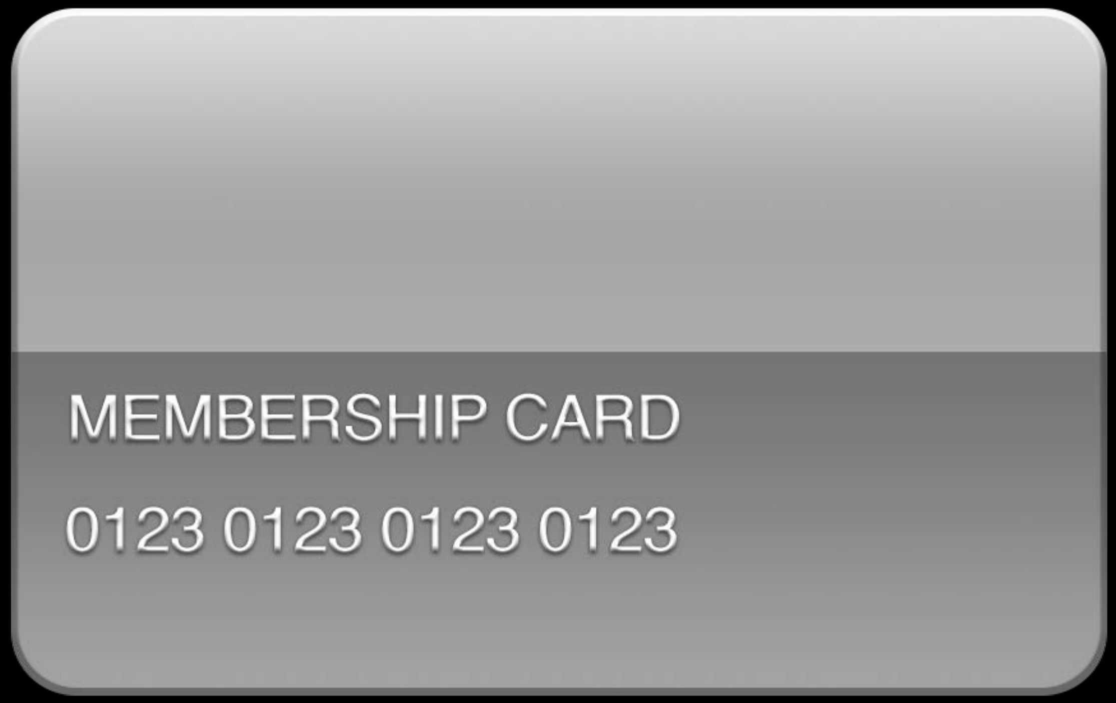


Uniqueness

Multiple use
Multiple person

BASIC

Multiple use
Single person



INTERMEDIATE

Quantified use

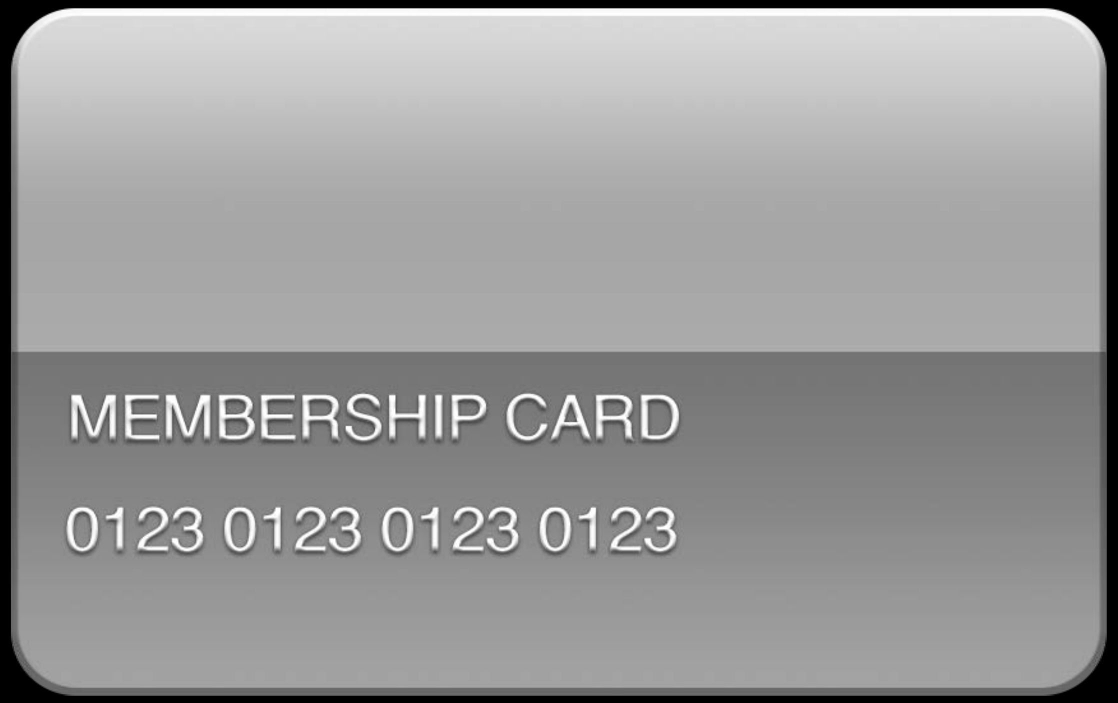
ADVANCED

Uniqueness

Multiple use
Multiple person

Multiple use
Single person

Quantified use



BASIC
INTERMEDIATE
ADVANCED

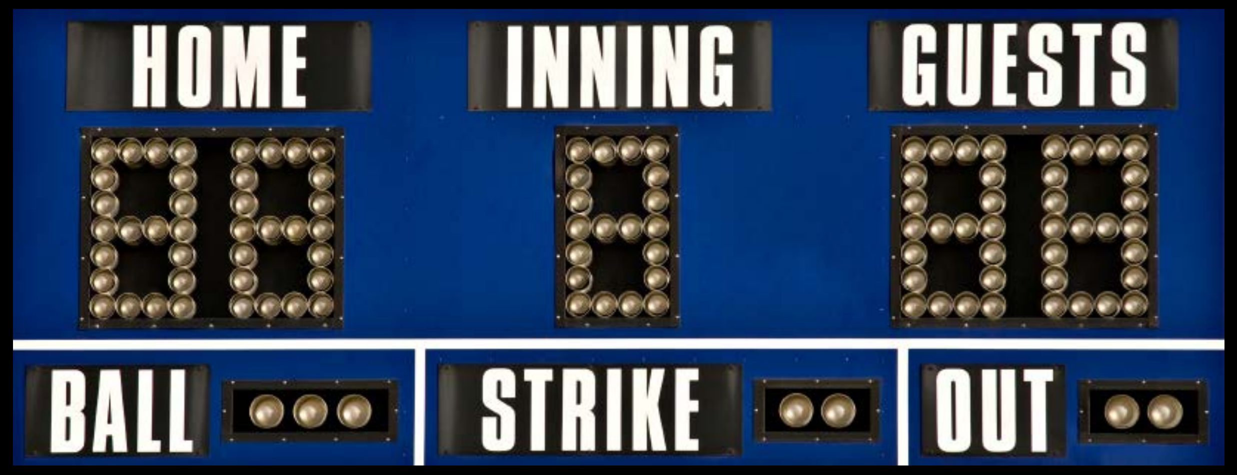
Static vs. Dynamic

Informational

Time sensitive

Multi-state

SOCIAL SECURITY
SOCIAL SECURITY ACCOUNT NUMBER
HAS BEEN ESTABLISHED FOR
SIGNATURE
FOR SOCIAL SECURITY AND TAX PURPOSES—NOT FOR IDENTIFICATION



BASIC

INTERMEDIATE

ADVANCED

Static vs. Dynamic

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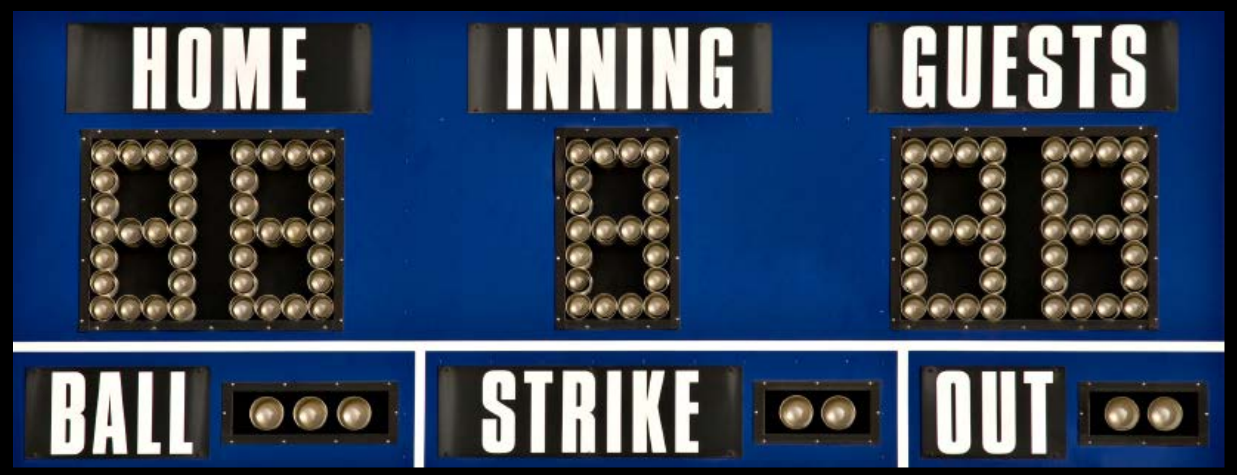
Time sensitive

Multi-state



BASIC — INTERMEDIATE — ADVANCED

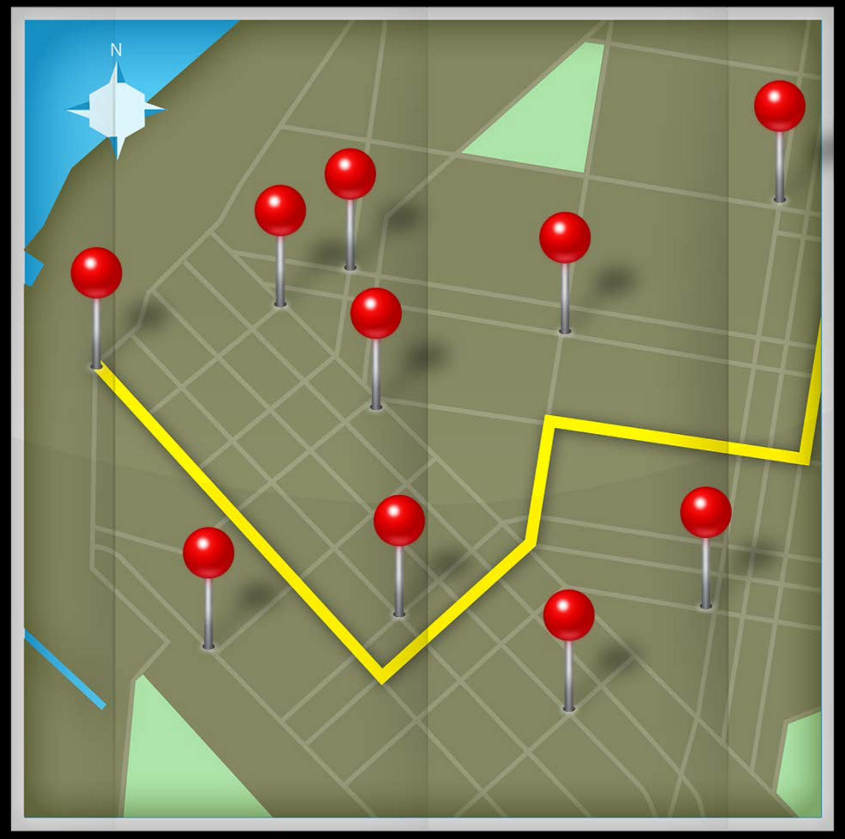
Scale

Few

1

BASIC

More



INTERMEDIATE

Many use

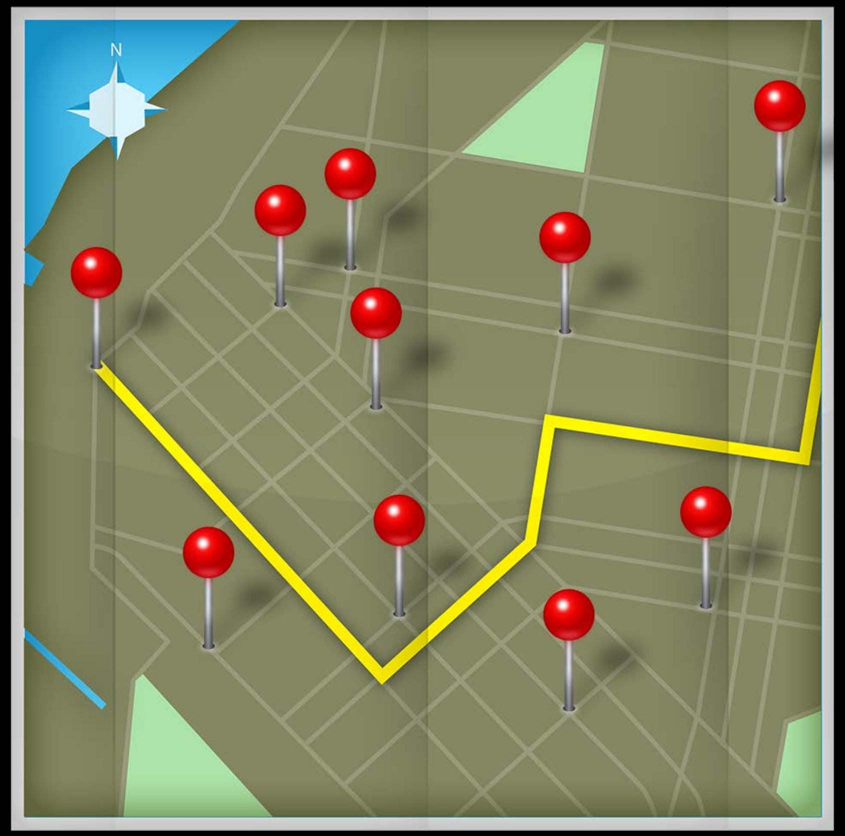
ADVANCED

Scale

Few

1

More



Many use

BASIC

INTERMEDIATE

ADVANCED

Systems Integration

iPhone only

BASIC

Electronic only

INTERMEDIATE

100+ Printed paper, cards, desktop, mobile

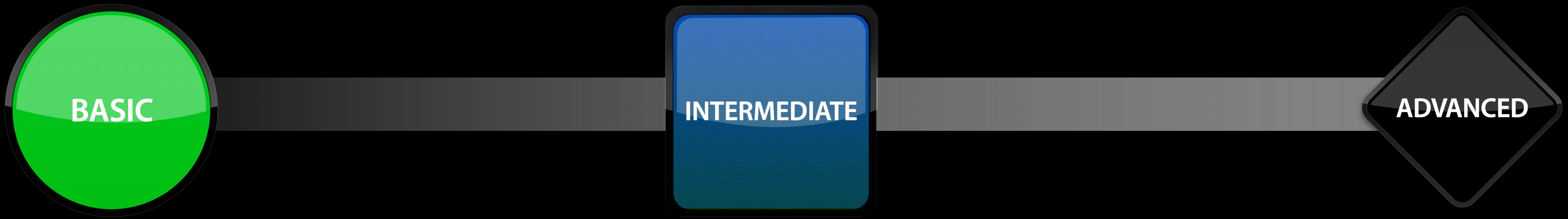
ADVANCED

Systems Integration

iPhone only

Electronic only

100+ Printed paper, cards, desktop, mobile



Don’t Assume

Complexity = Better

Complexity $\boxed{\neq}$ Better

Summary—Facets of Complexity

- Value
- Uniqueness
- Static vs. dynamic
- Scale
- Systems integration

Web Services Tips and Tricks

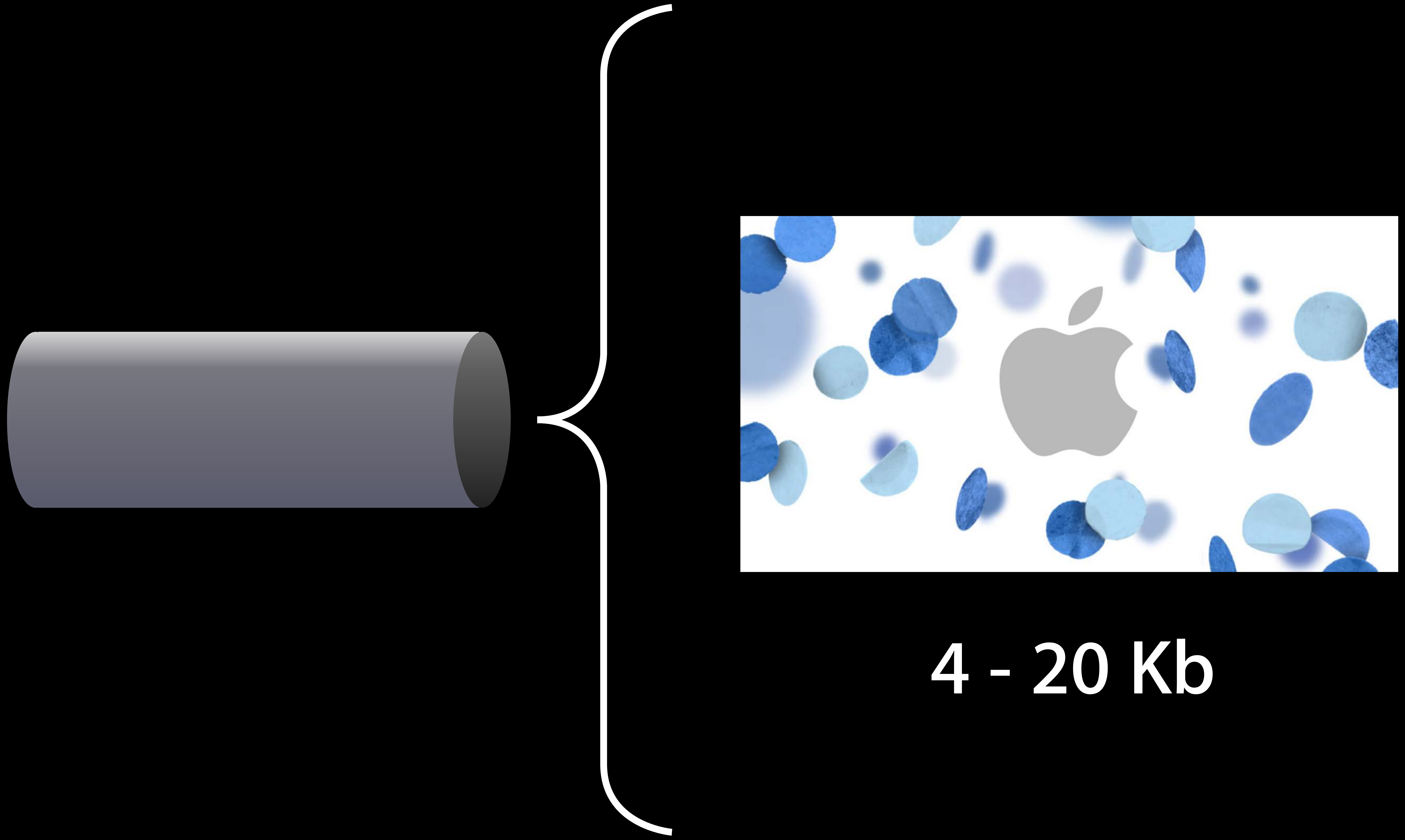
Something for every complexity level

Tips—Basic

- Review Pass Asset Sizes
- Adhere to If-Modified-Since
- Implement Logging Endpoints
- Expect Dependency Outages

One—Review Pass Asset Sizes

BASIC



One—Review Pass Asset Sizes

BASIC

280 Kb

One—Review Pass Asset Sizes

BASIC

280 Kb

Review Pass Asset Sizes

Impacts performance and scalability

BASIC

- Size your image assets appropriately for the pass
- Set an upper limit for the size of pass
- Log and/or alert if the pass size exceeds this limit

Two—Adhere to If-Modified-Since

Impacts performance, scalability, reliability

BASIC

- RFC 2616
- Lets clients make conditional requests
- Required by Passbook
- Reduces bandwidth usage

Adhere to If-Modified-Since

Request response contents

BASIC

Get Pass Request

Method: GET
Header:

```
  If-modified-since
  <timestamp>
```

Get Pass Response

```
HTTP Status: 200
Header:
  Last-Modifed
  <timestamp>
Contents: PKPASS
```

Adhere to If-Modified-Since

Request response contents

BASIC

Get Pass Request

Method: GET
Header:

```
If–modified–since
<timestamp>
```

Get Pass Response

```
HTTP Status: 304
```

Three—Implement Logging Endpoints

It’s free feedback

BASIC

- Highly recommended
- Passbook sends error message back to the log back endpoint
- Human readable errors

```
https://webServiceURL/v1/log
```

```
Method: POST
{
   logs = [
      “Server ignored the 'if-modified-
      since' header (date) and returned
      the full unchanged pass data for
      serial number”
   ]
}
```

Four—Expect Dependency Outages

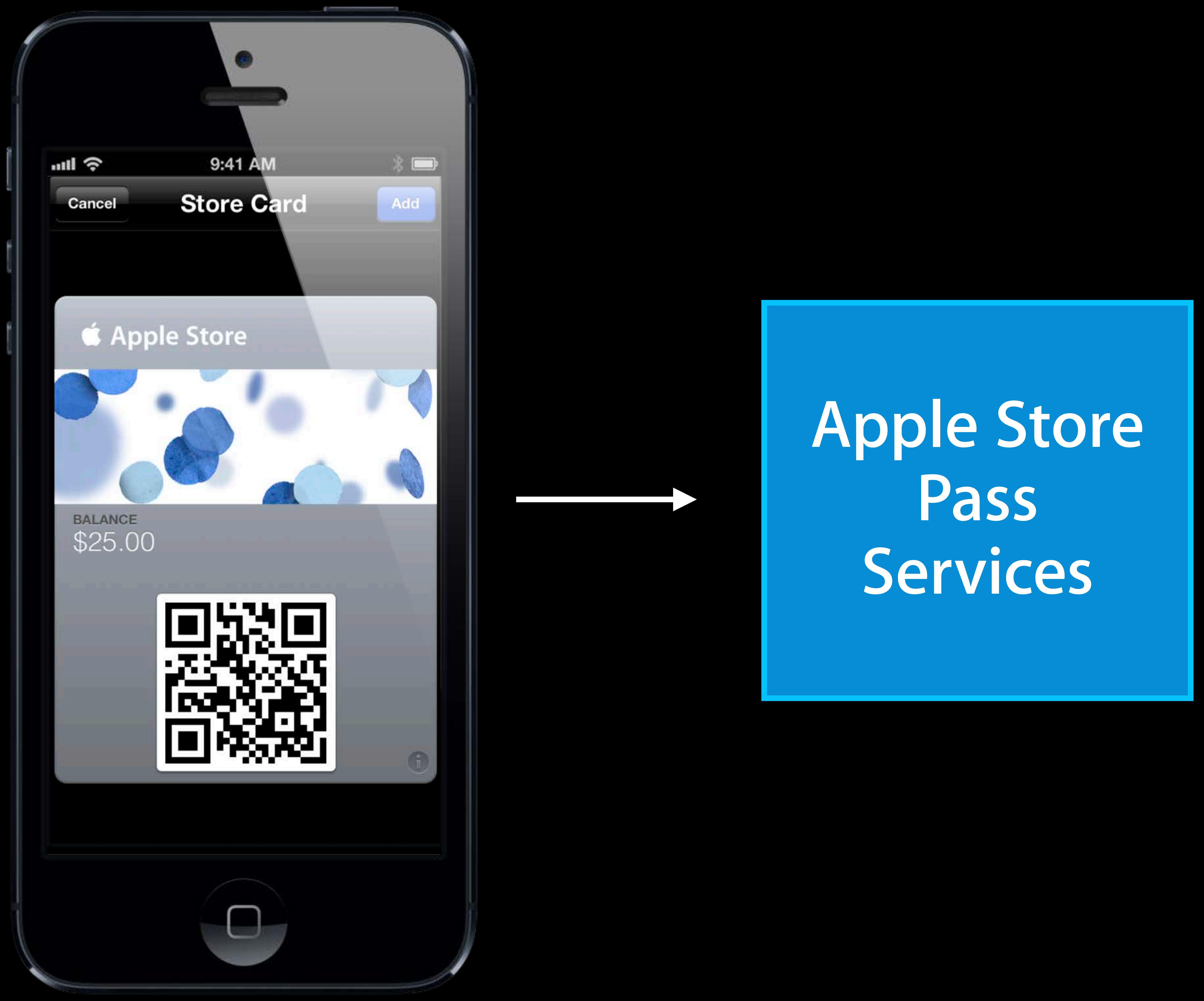
With your own service

BASIC

Four—Expect Dependency Outages

With your own service

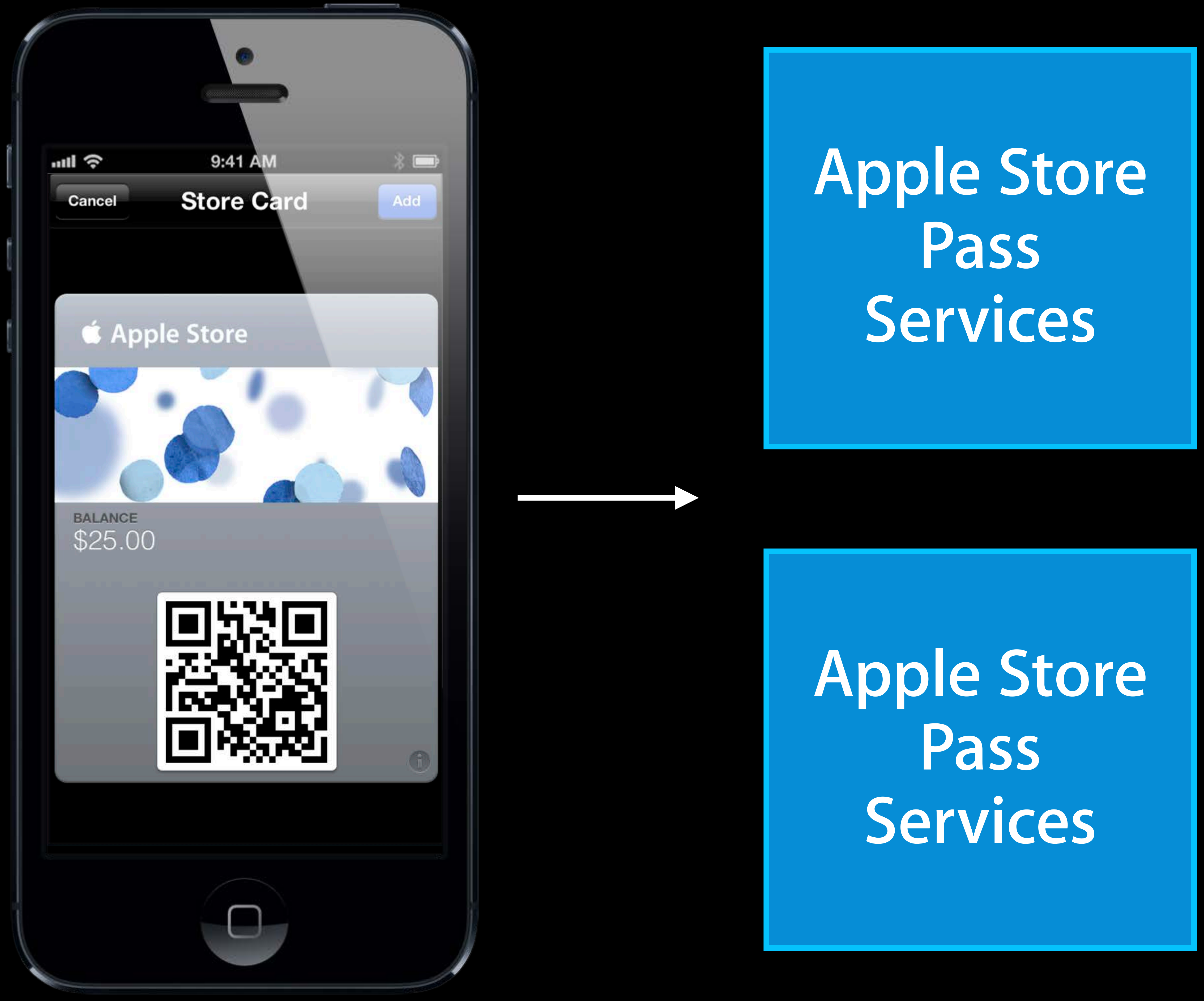
BASIC



Expect Dependency Outages

Redundancy is good

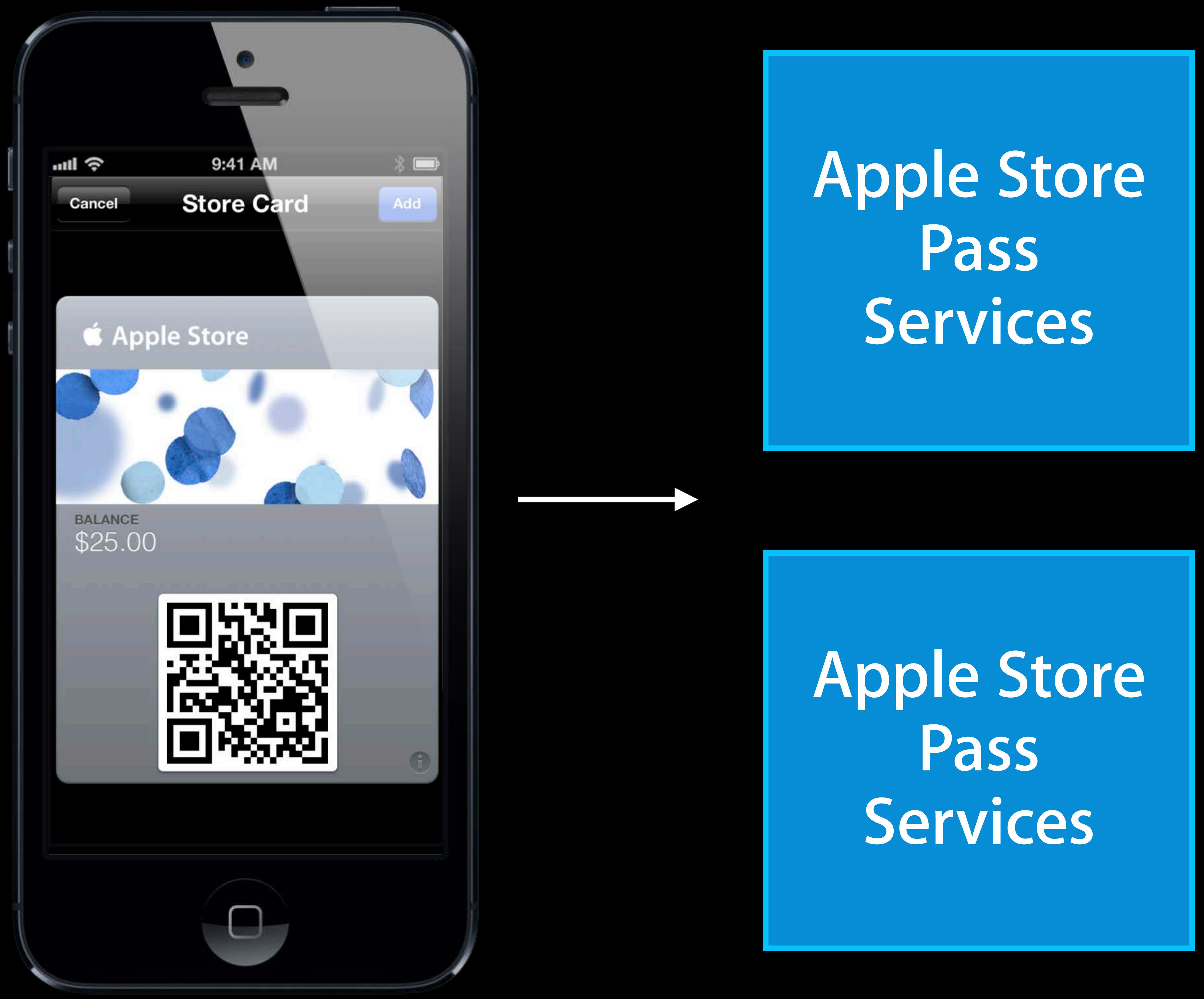
BASIC



Expect Dependency Outages

Dependencies will go down

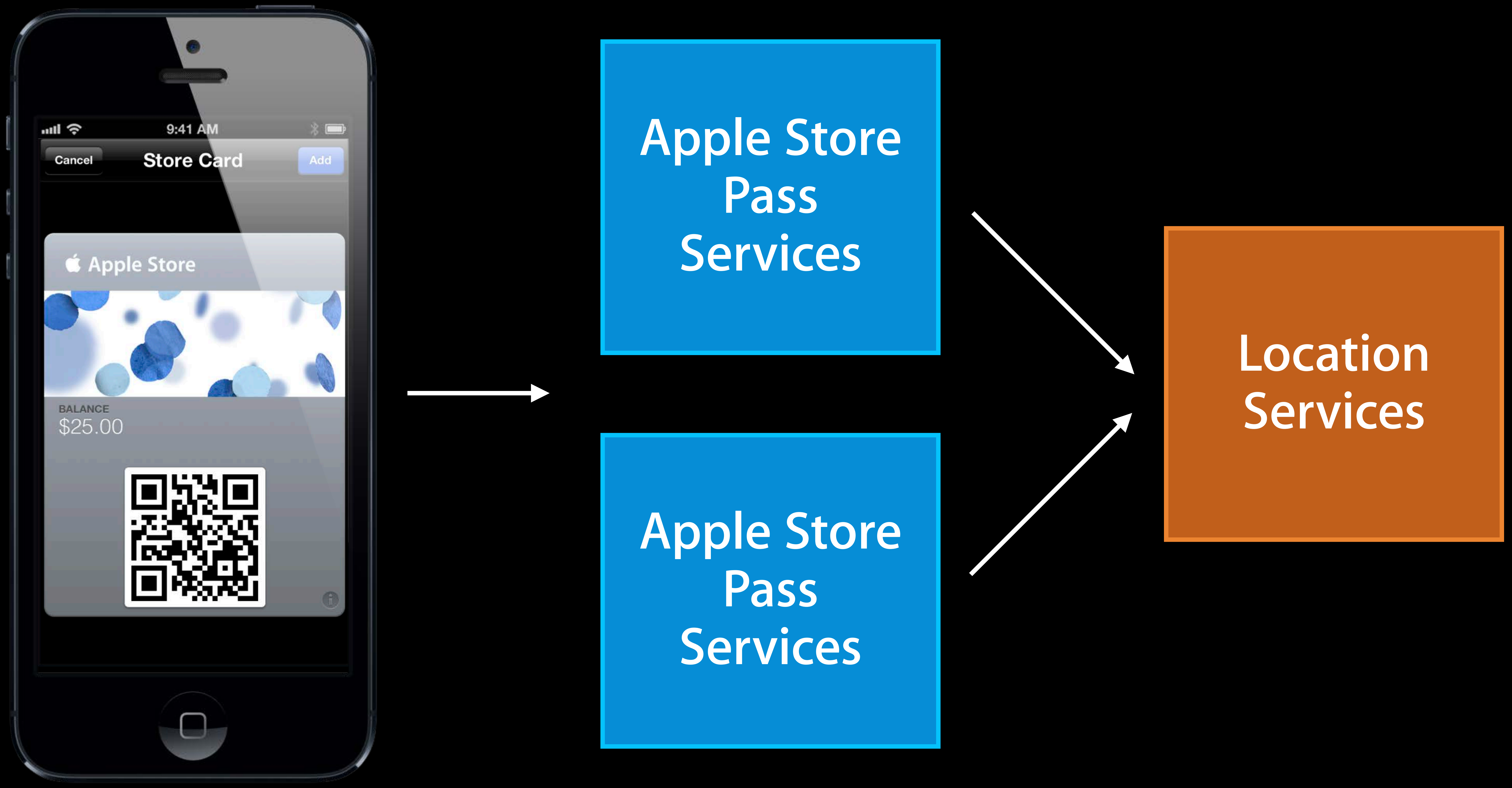
BASIC



Expect Dependency Outages

Dependencies will go down

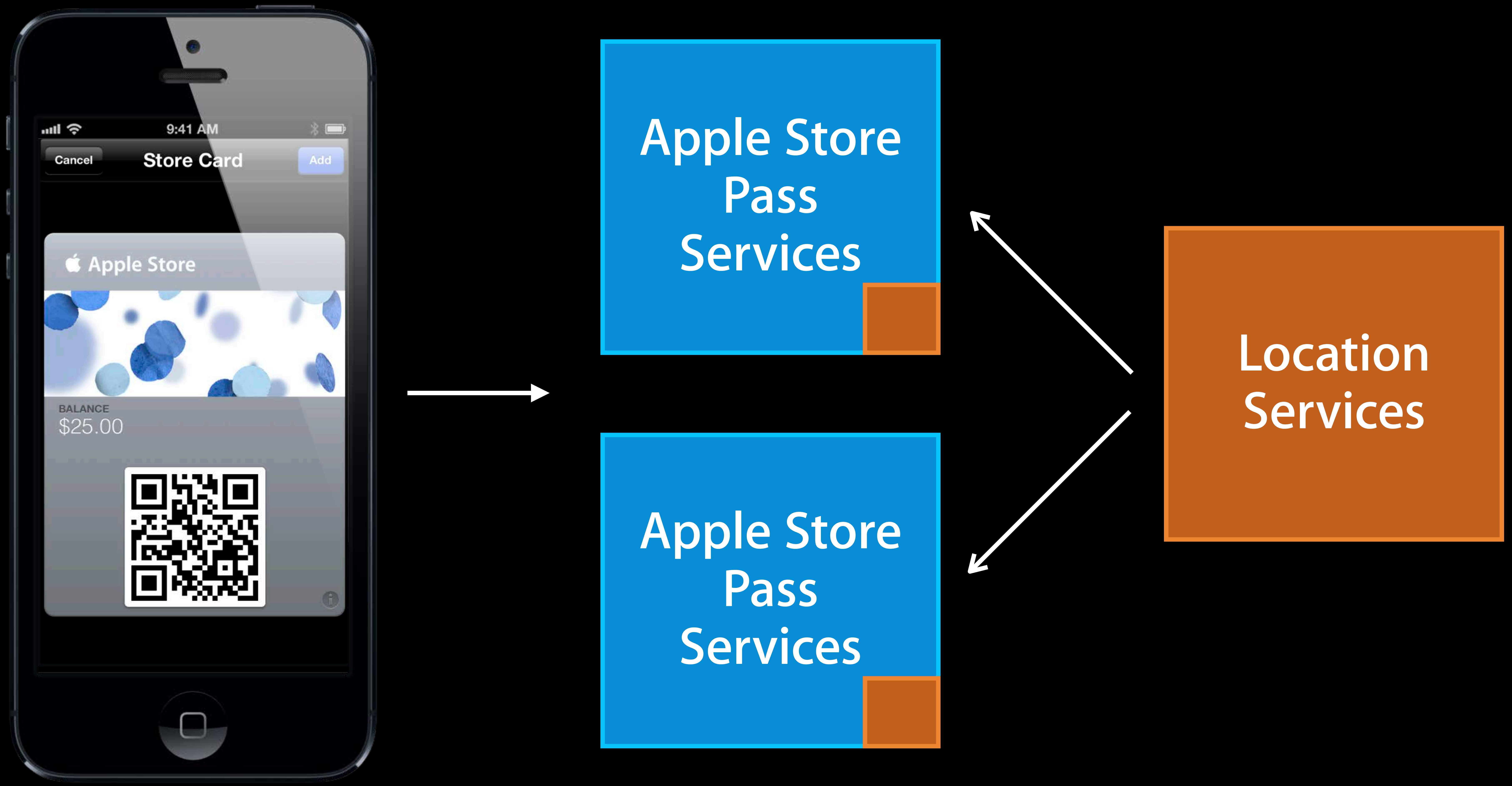
BASIC



Expect Dependency Outages

Dependencies will go down

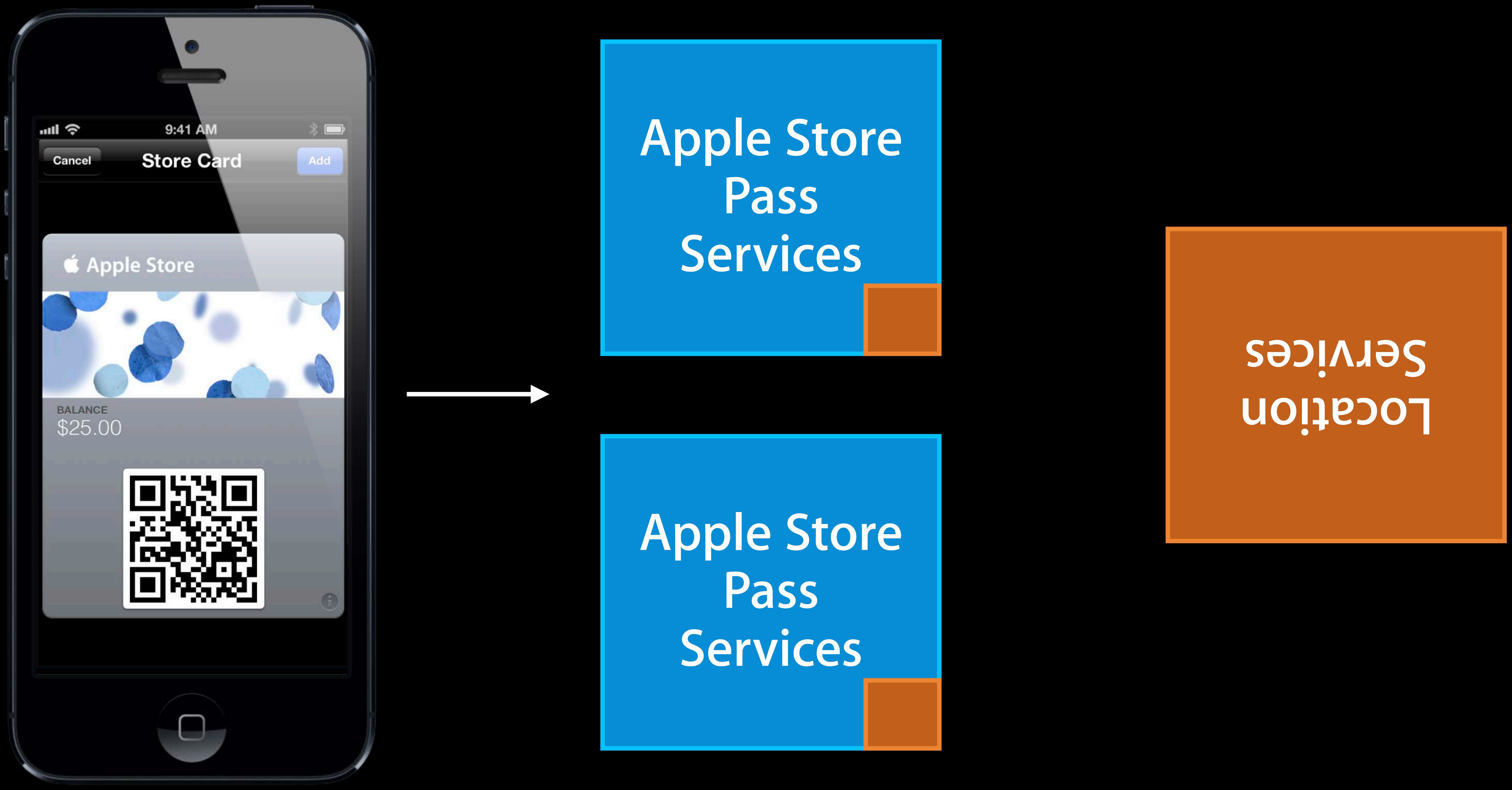
BASIC



Expect Dependency Outages

BASIC

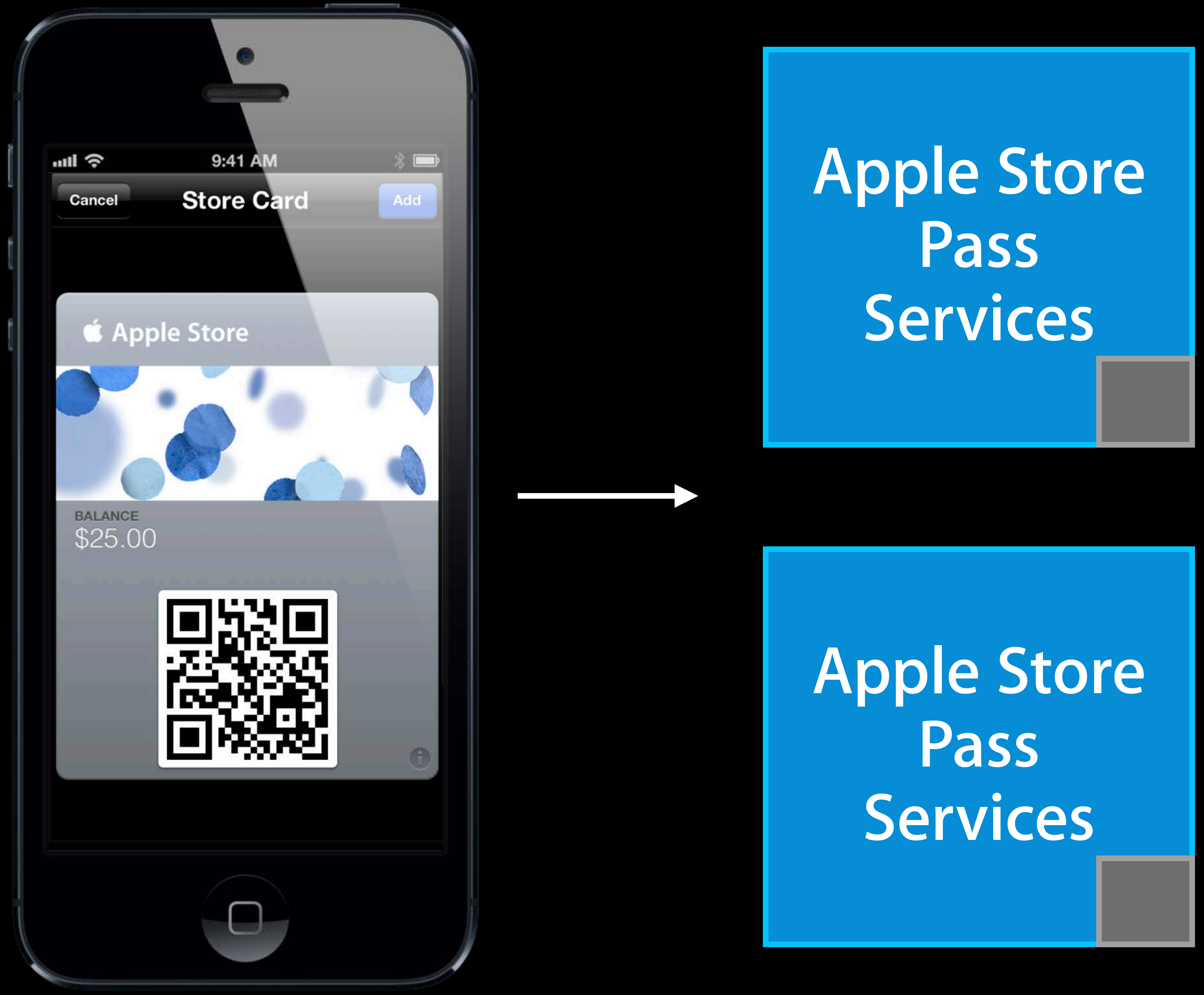
Dependencies will go down



Expect Dependency Outages

Is that dependency required?

BASIC



Expect Dependency Outages

BASIC

Impacts reliability

- Pass should be served with bare minimum assets even when dependencies are not responding
    - Make default fallback data readily available for assets (images, text), locations

Tips—Intermediate

- Validate the Origin
- Validate Significant Contents
- Leverage Caching
- Monitor

One—Validate the Origin

Impacts performance, security and reliability

INTERMEDIATE

- It’s not sufficient to simply test if the card is valid
- Make sure the pass came from you
- Sign your pass and check your signature

Validate the Origin

Remember authentication token

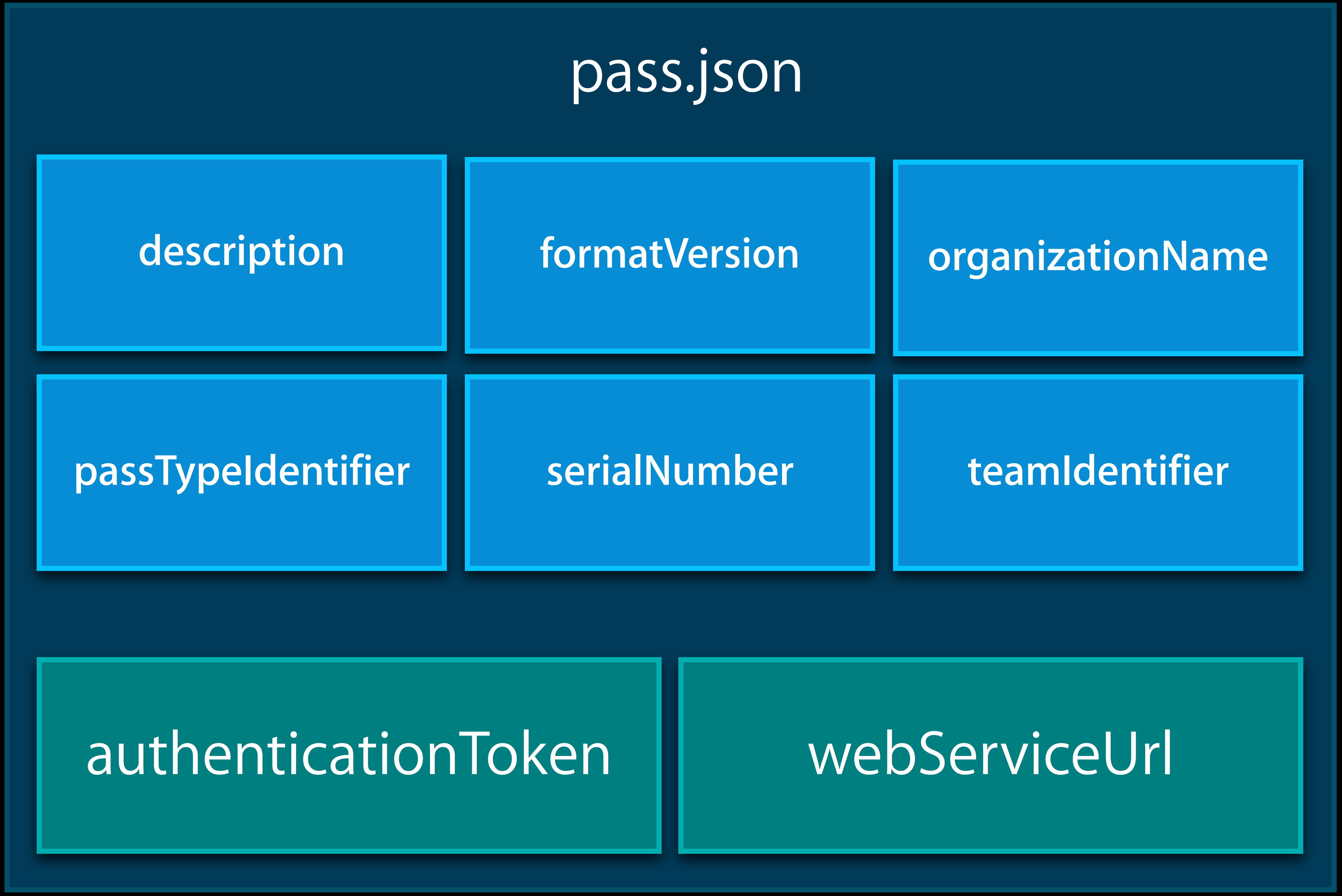
INTERMEDIATE

authenticationToken

Validate the Origin

Passbook package contents

INTERMEDIATE



Validate the Origin

Web services with authorization header

INTERMEDIATE

- Register a device
- Get latest version of a pass
- Unregister a device

Register a device

Method: GET
deviceLibraryIdenfitier
passTypeIdentifier
serialNumber

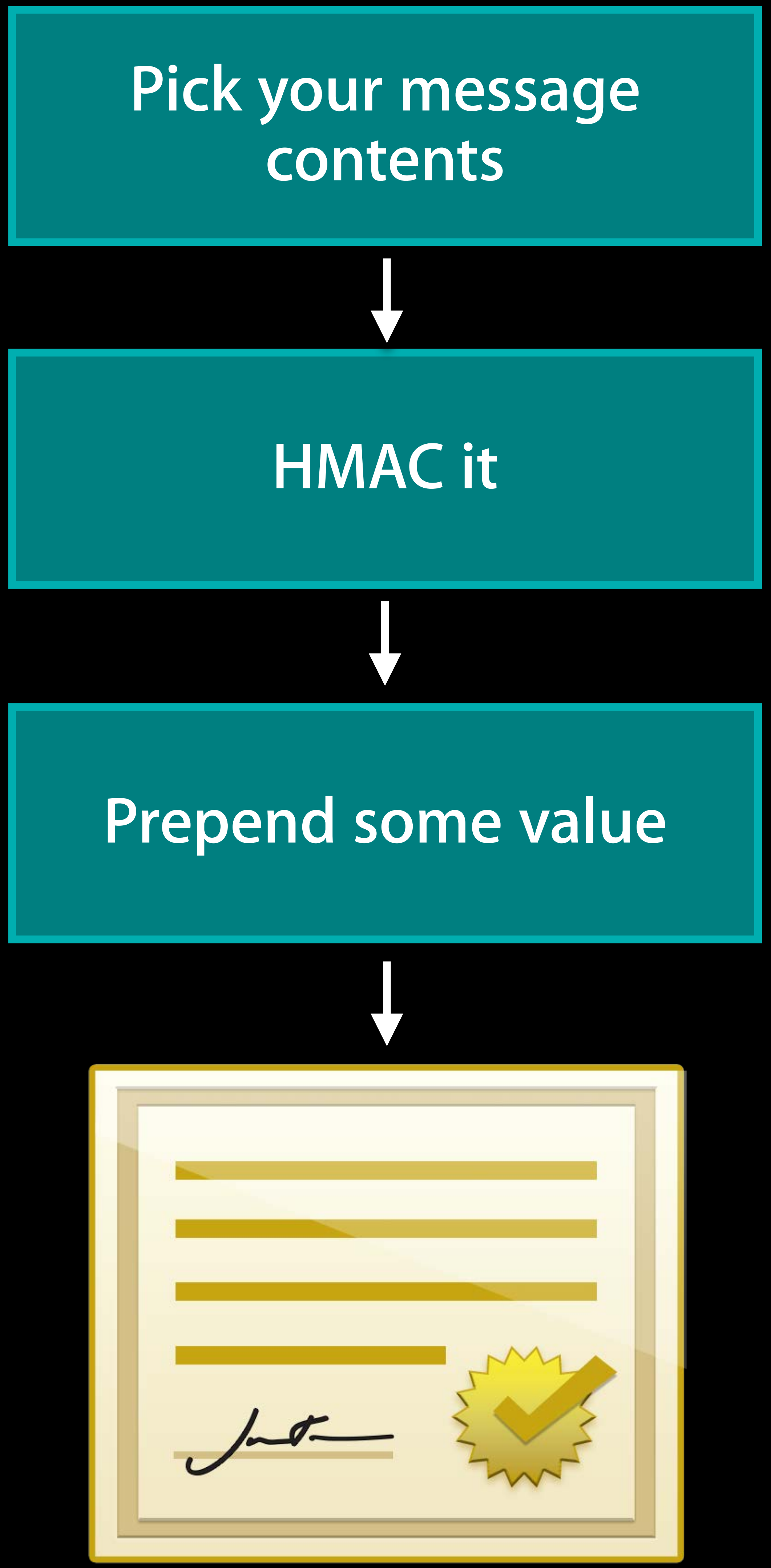
Headers:
Authorization: ApplePass
84jhadk9587dlad...

INTERMEDIATE

Validate the Origin

Build your authentication token using HMAC

- HMAC—Keyed Hash Message Authentication Code (RFC2014)
- Verify
  - Auth token is signed
  - Key is private
  - Strong enough against brute force
- Then auth token was created by you



Validate the Origin

Every language has it

INTERMEDIATE

OpenSSL::HMAC

hash_hmac

Bouncy Castle

hmac.new

Two—Validate Significant Contents

INTERMEDIATE

Impacts security

- Anyone can create a pass
- The pass is not authoritative
- Always check the source of truth

Three—Leverage Caching

Impacts performance, scalability, reliability

INTERMEDIATE

- Cache as much downstream data as possible
    - Product services
    - Location services
    - Image services
- Cache encrypted and decrypted values for HMAC or authentication token
- Consider caching the .pkpass file

Four—Monitor

Impacts reliability

INTERMEDIATE

- Be the first to know when your servers go down
- There are numerous external websites that do monitoring
    - Build a query against one of your production test passes
    - Validate response is status 200
    - Check your pass size
- Internal logging systems
    - Asset sizes
    - Certificate expiration warnings (signing and push notifications)
- Internal monitoring

Tips—Advanced

For the most complex passes

- Rate Limit
- Process Asynchronously
- Leverage AuthToken as Storage
- Distinguish Dev and Prod Passes
- Build in Debug-ability

One—Rate Limit

Impacts reliability

ADVANCED

- Prevents
  - Denial of service attack
  - Brute force attack
- Set high limits for IP based rules
- Set lower limits based on serial numbers

Two—Process Asynchronously

ADVANCED

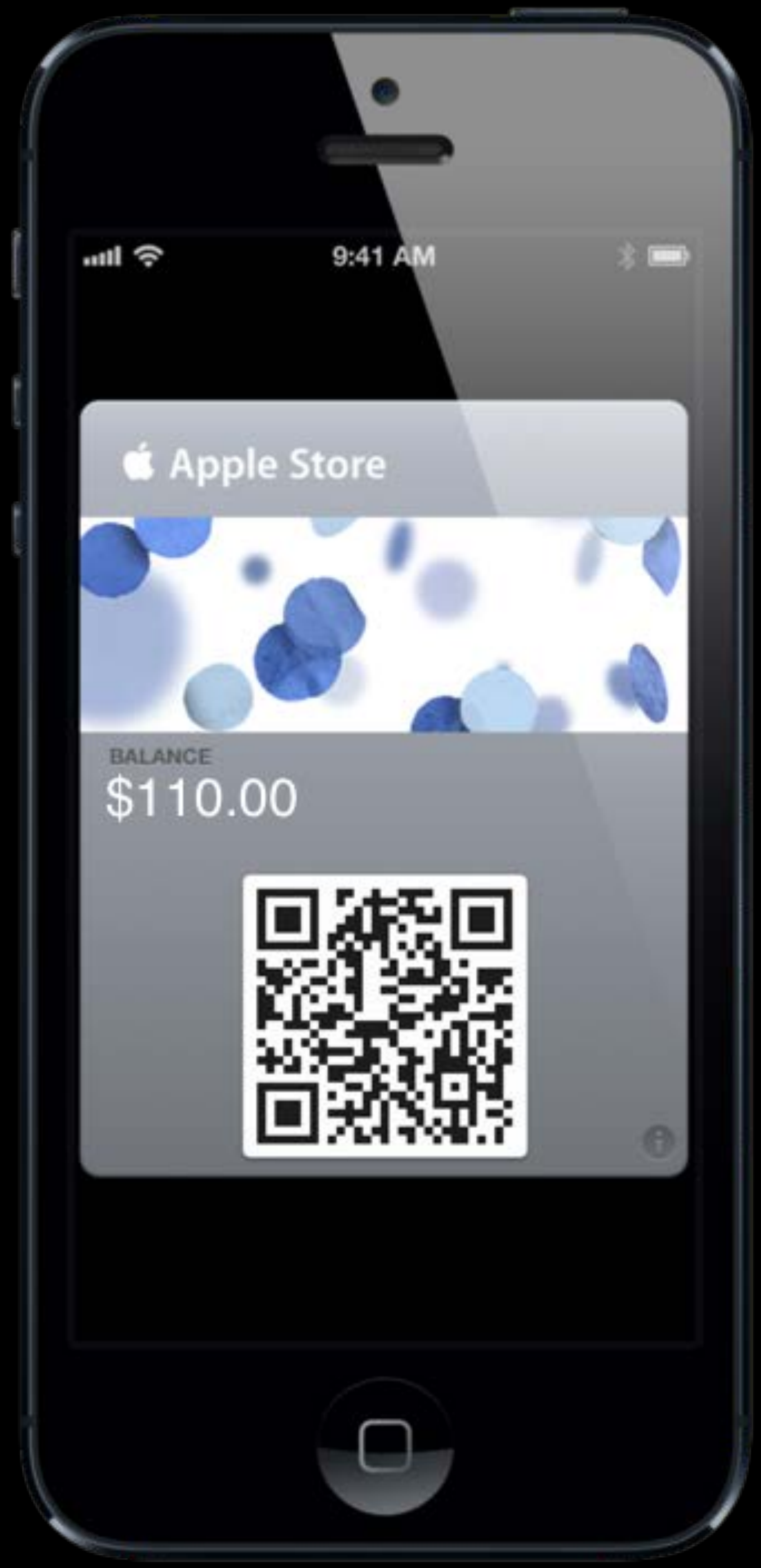
Impacts performance and scalability

- Pre-warm your caches (i.e. images)
- Logs can be written to disk asynchronously
- Use a queue for push notifications
- Avoid holding connections open for long periods of time

Three—Leverage Auth Token as Storage

ADVANCED

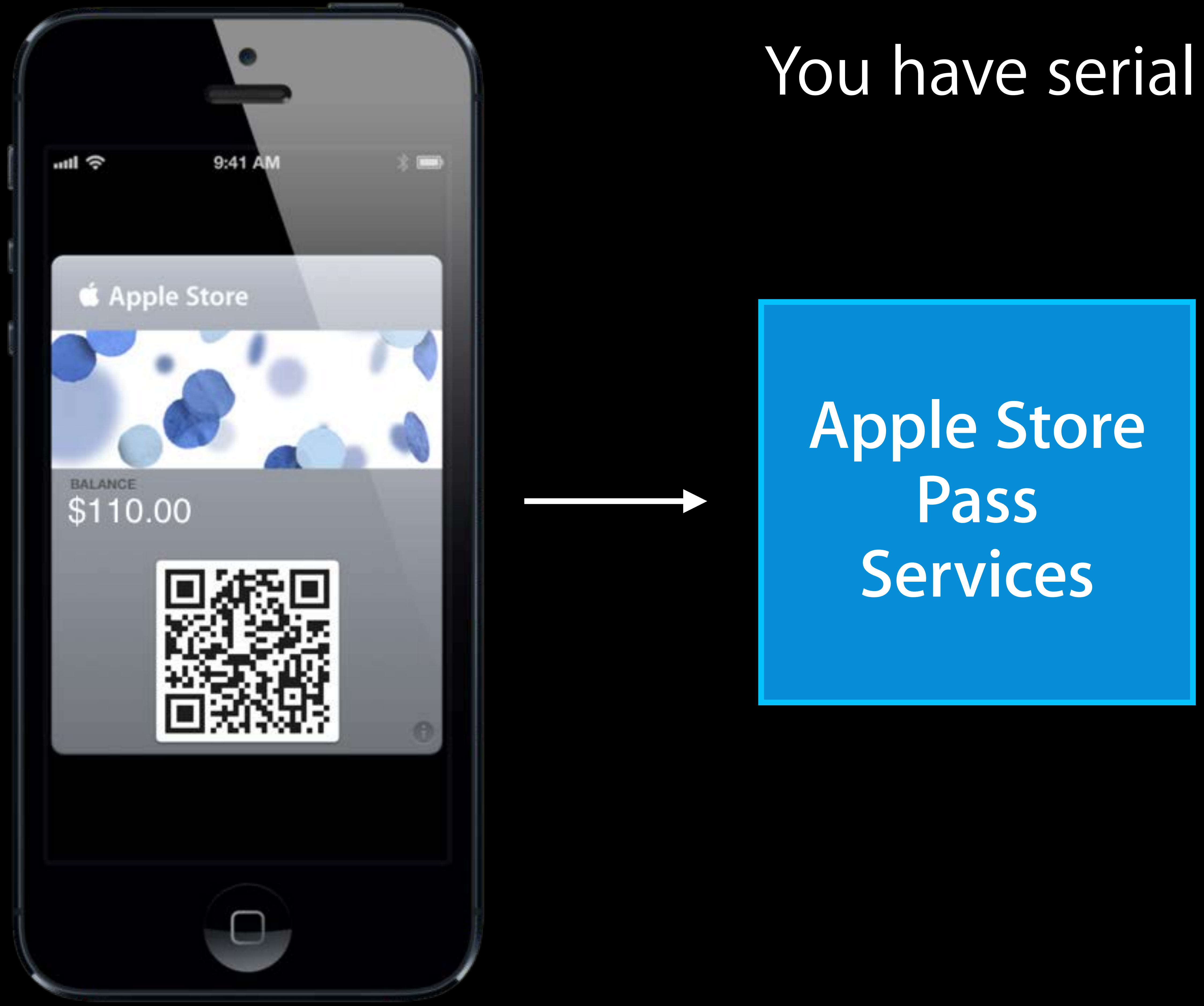
Impacts performance and reliability



Three—Leverage Auth Token as Storage

ADVANCED

Impacts performance and reliability

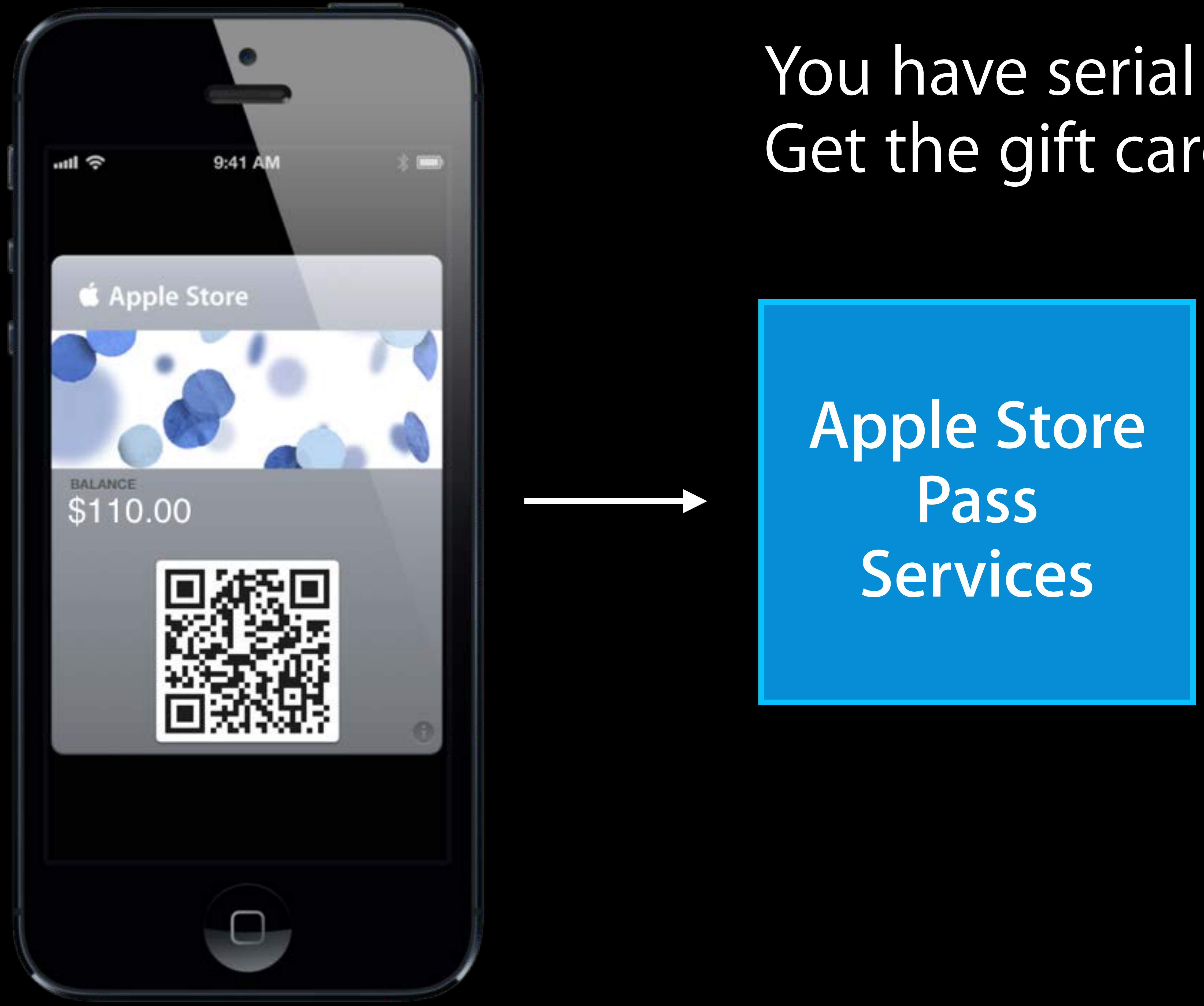


You have serial number

Three—Leverage Auth Token as Storage

ADVANCED

Impacts performance and reliability



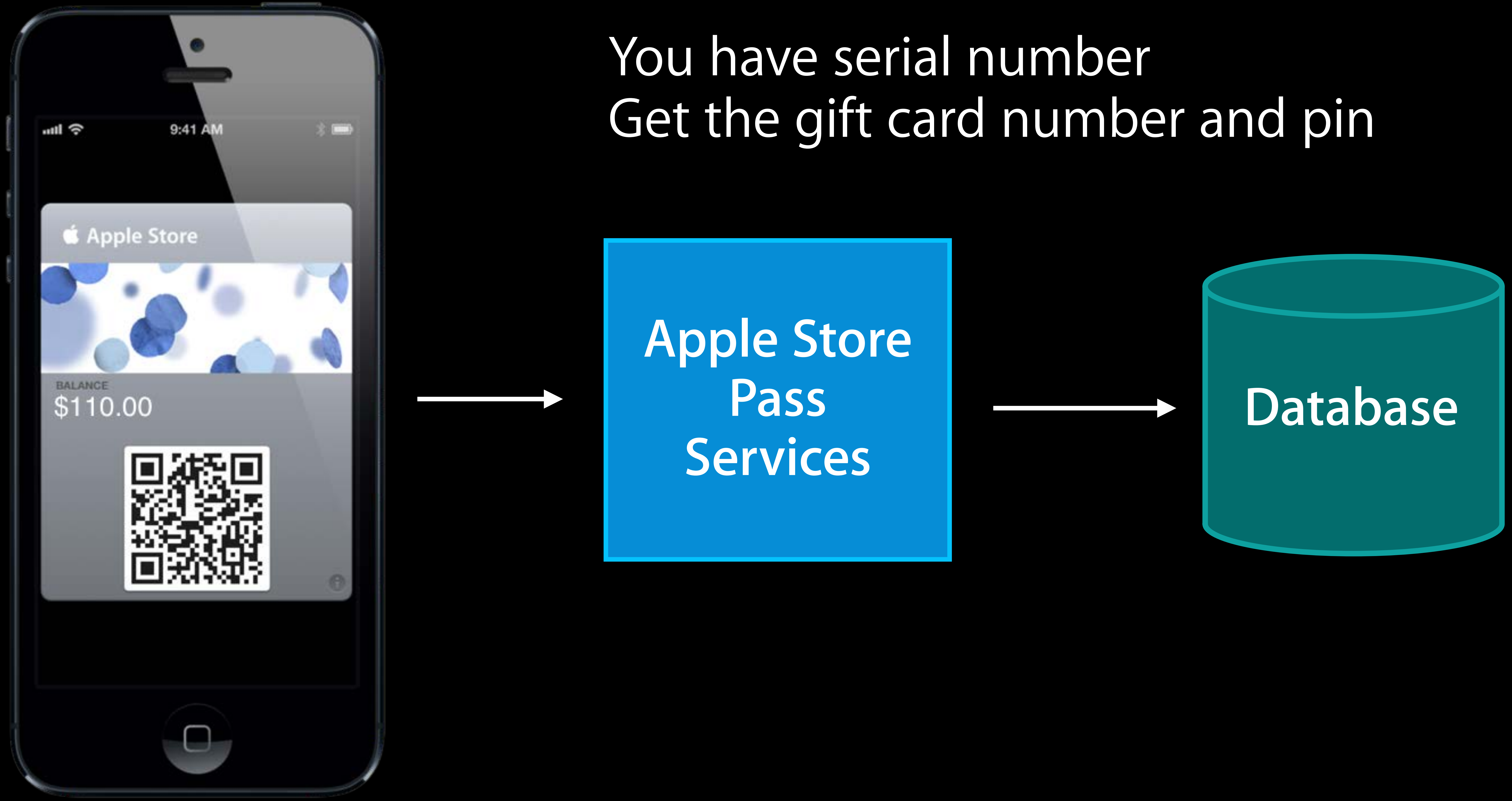
You have serial number
Get the gift card number and pin

Three—Leverage Auth Token as Storage

ADVANCED

Impacts performance and reliability

You have serial number
Get the gift card number and pin

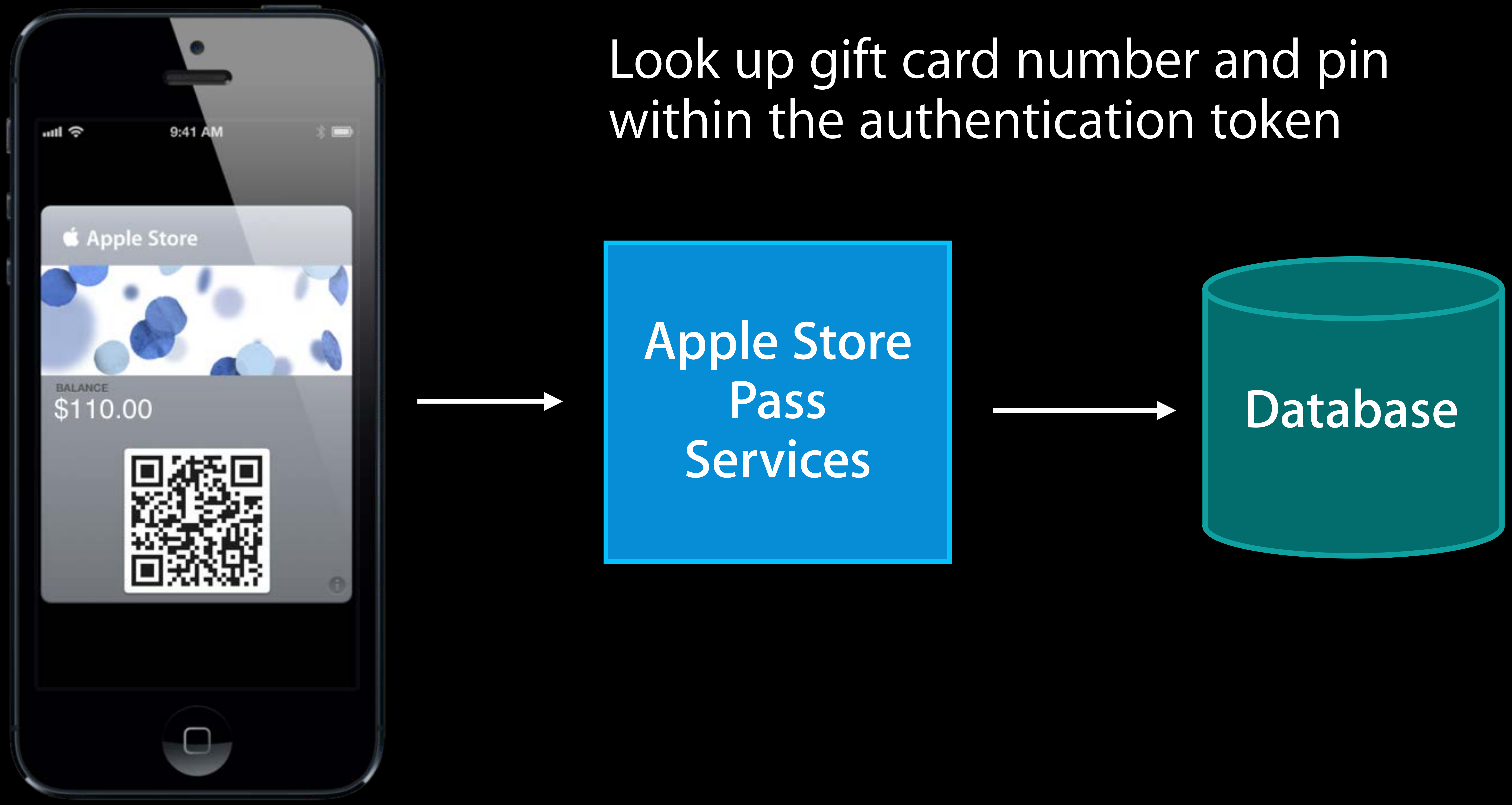


Three—Leverage Auth Token as Storage

ADVANCED

Impacts performance and reliability

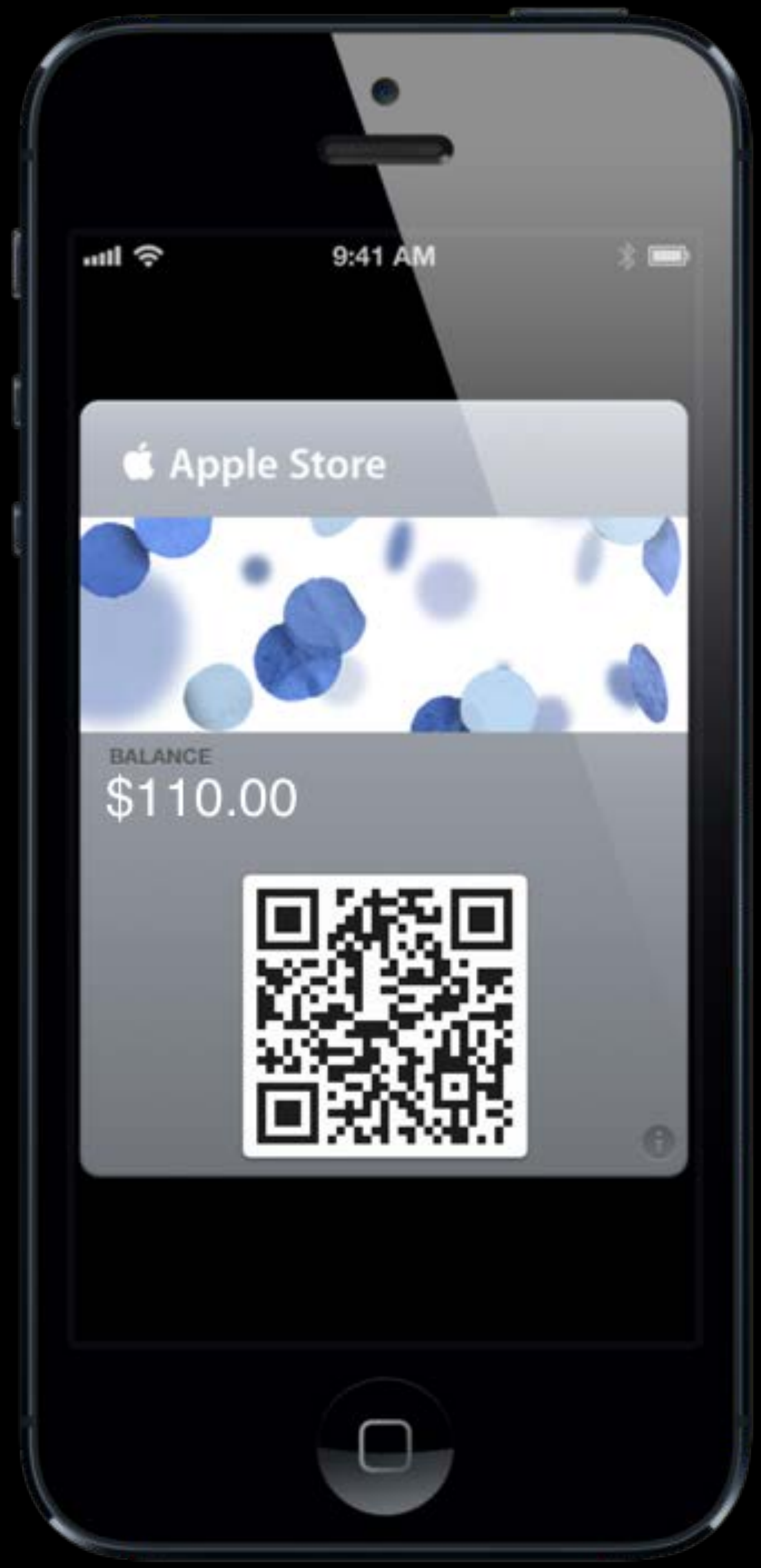
Look up gift card number and pin within the authentication token



Three—Leverage Auth Token as Storage

ADVANCED

Impacts performance and reliability



$\longrightarrow$ **Apple Store Pass Services**

Look up gift card number and pin within the authentication token

Leverage Auth Token as Storage

ADVANCED

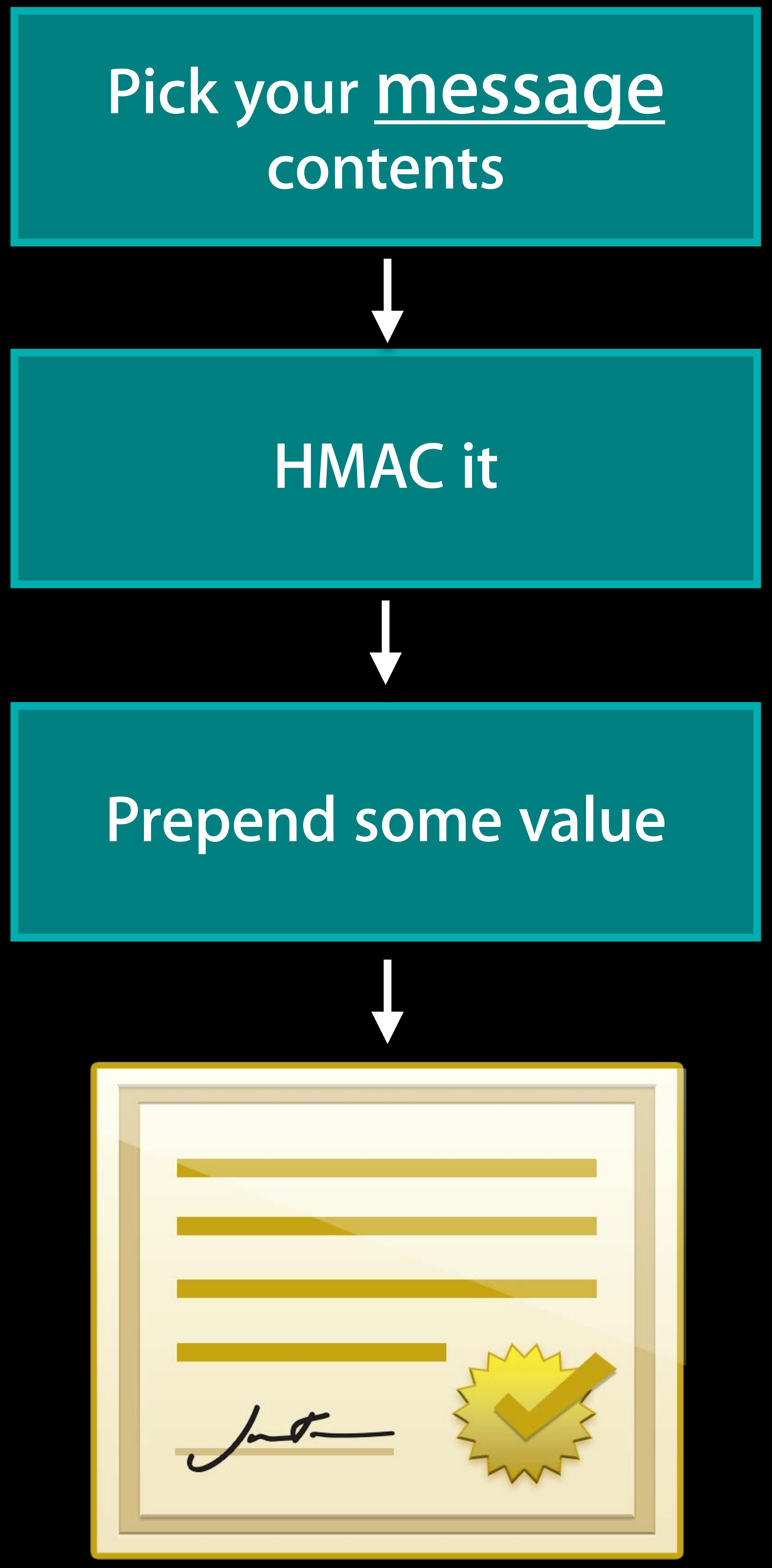
Remember authentication token

authenticationToken

Leverage Auth Token as Storage

Store pass specific information inside the “message”

ADVANCED



Leverage Auth Token as Storage

ADVANCED

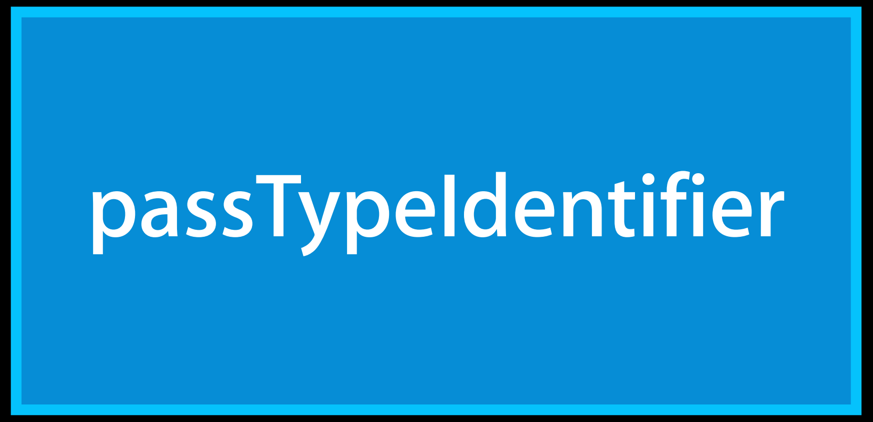
Minimize your dependencies

- Store encrypted relevant data in authentication token to minimize your dependency on DB and increase your reliability
- Items you could store
  - Product details - strip image url
  - Gift card number or PIN numbers
  - Important dates
  - Nearest 10 locations

Four—Distinguish Test and Production

Remember the pass type identifier

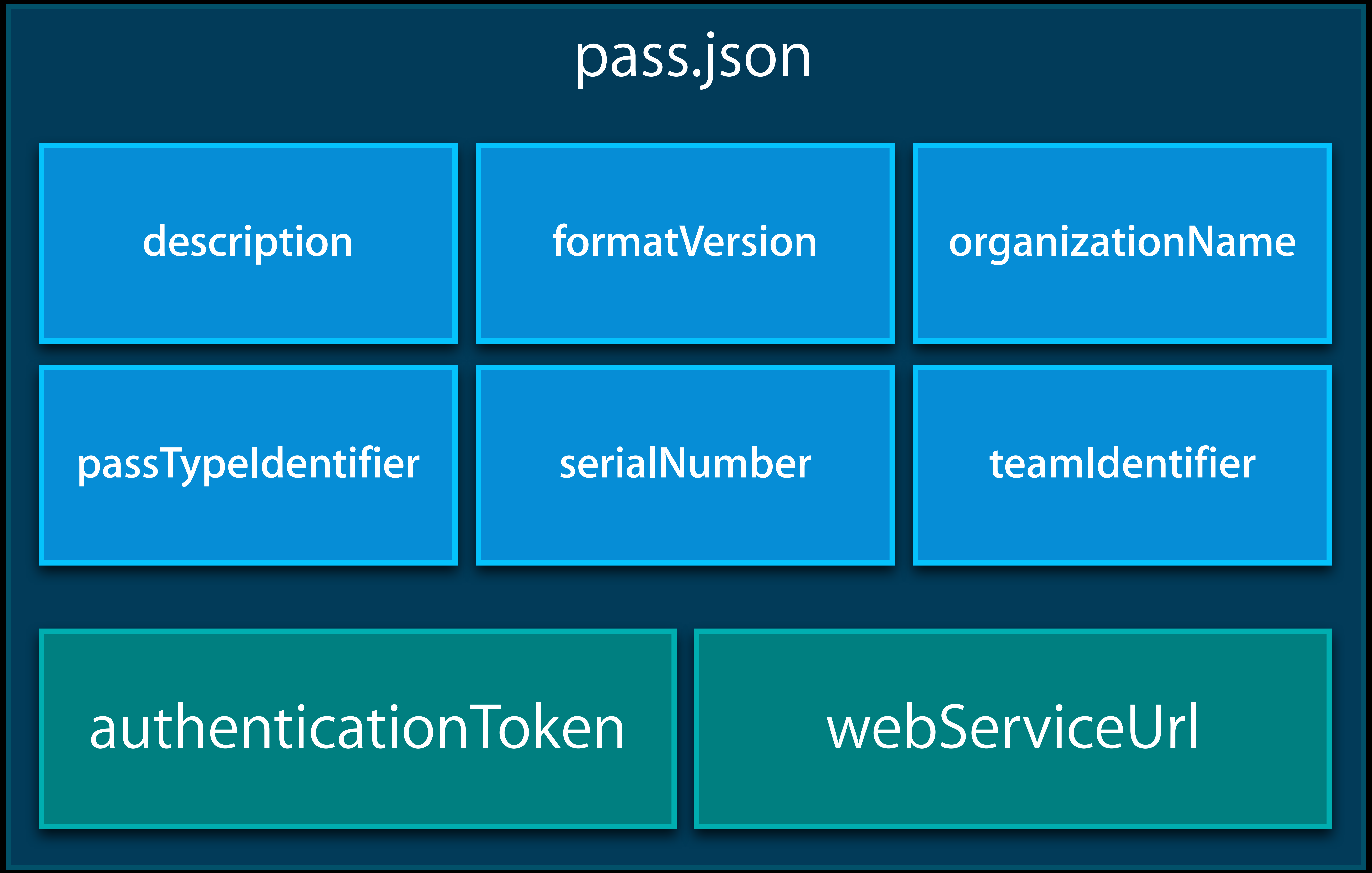
ADVANCED



Distinguish Test and Production

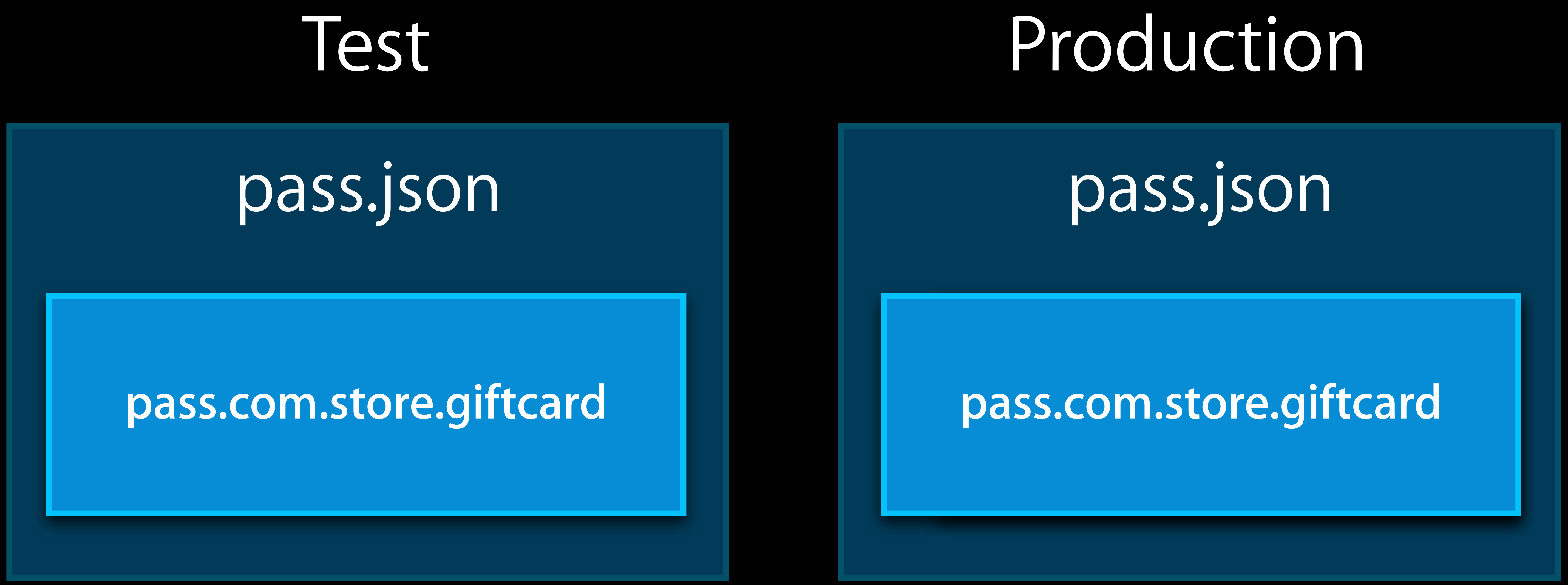
Passbook package contents

ADVANCED



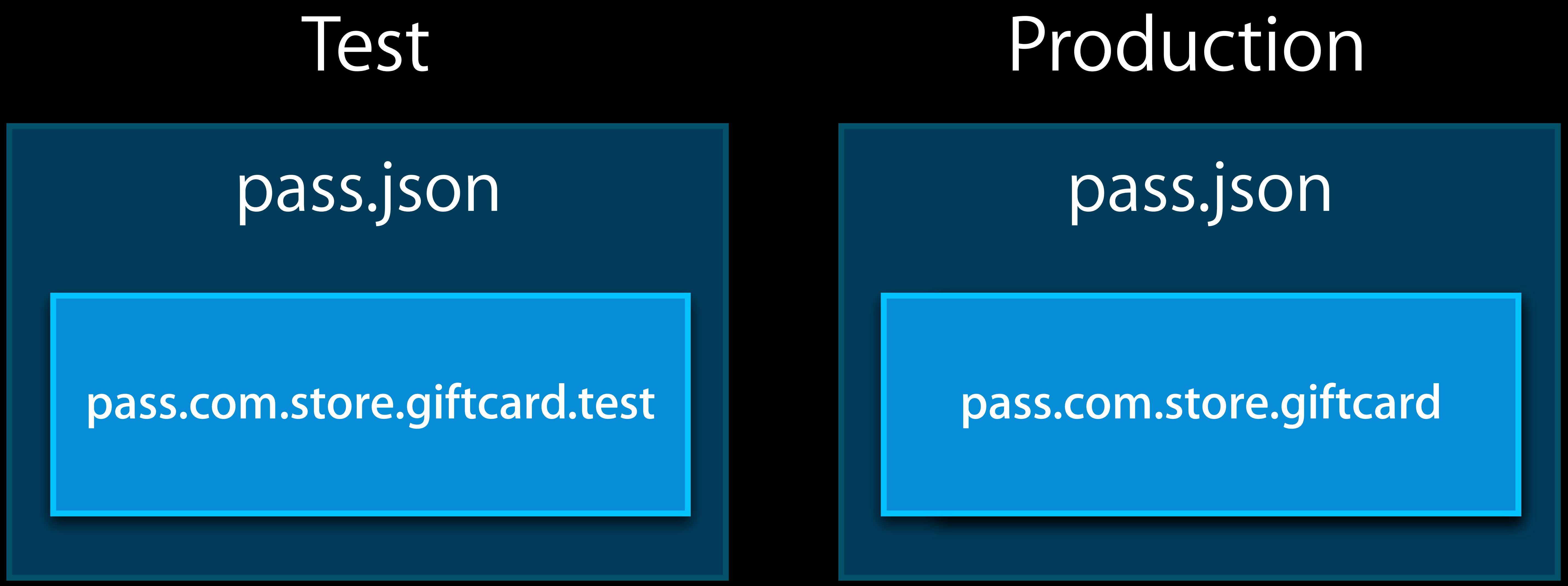
Distinguish Test and Production

ADVANCED



Distinguish Test and Production

ADVANCED



Five—Build in Debugging

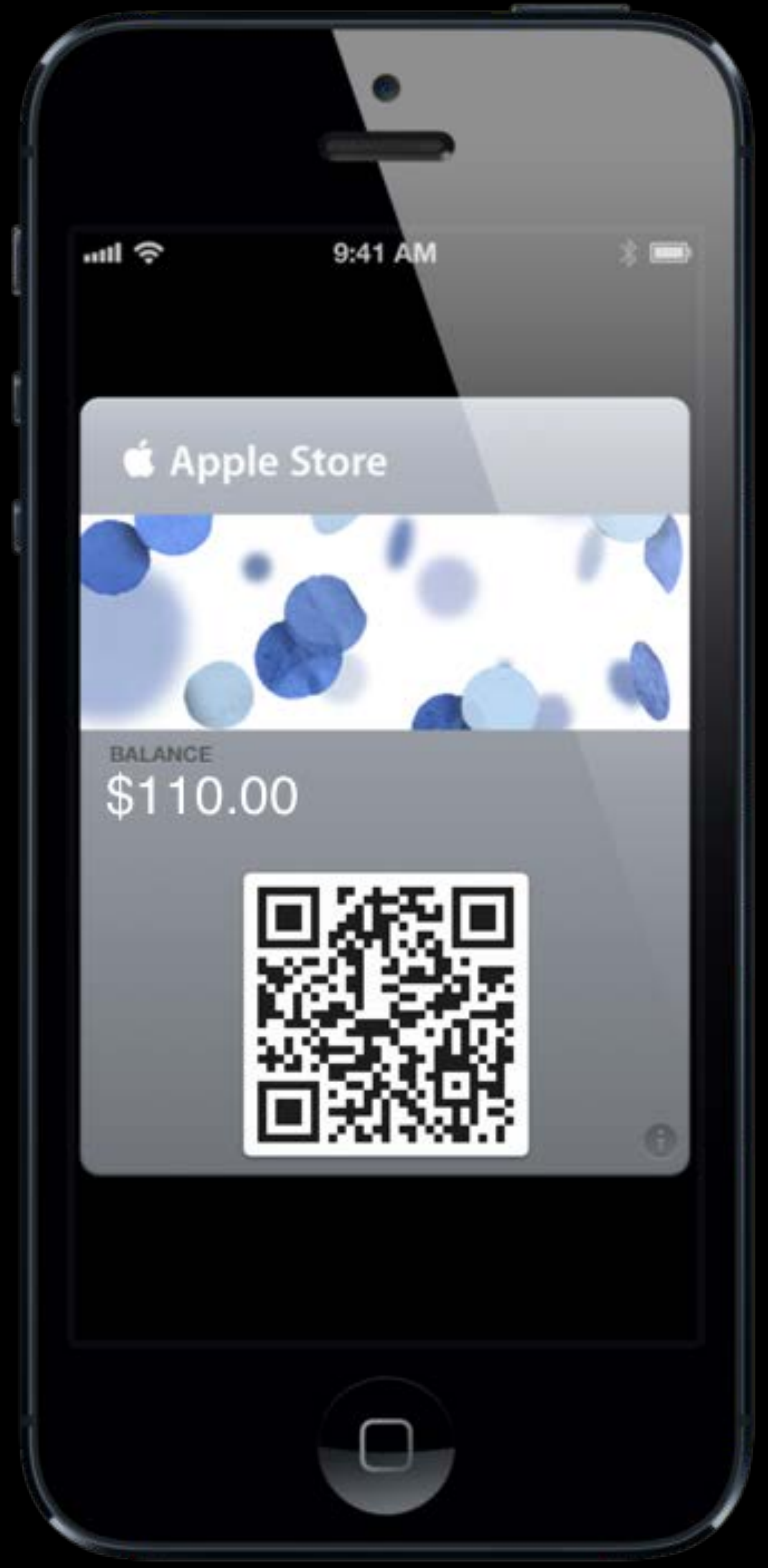
Impacts reliability

ADVANCED

- Be ready to troubleshoot it in production
- Leverage the back of pass for debug information
- Have a test serial number for production
- Turn on a flag on this test pass
- Display extra information on the back of the pass
  - Host or data center
  - Locations
  - Last updated date

Summary

- Apple Store Gift Card
- Leveraging Existing Systems
- Determining Complexity
- Web Services Tips and Tricks



More Information

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Documentation
Passbook Programming Guide
http://developer.apple.com/passbook

Apple Developer Forums
http://devforums.apple.com

Related Sessions

What's New in Passbook	Pacific Heights Wednesday 11:30AM
Harnessing iOS to Create Magic in Your Apps	Presidio Friday 11:30AM

Labs

Passbook Lab	Services Lab A Wednesday 4:30PM

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