Using Receipts to Protect Your Digital Sales

Session 308

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Mac App Store

In-App Purchases

In-App Purchases

96%

Of the Top-Grossing Apps

Agenda

Agenda

Introducing the Receipt

Understanding Receipts

Validation and Inspection

Implementing Validation

Testing with Receipts

Introduction

The receipt

- Trusted record of purchase
  - Issued by the App Store
  - Stored on device
- Signed and verifiable
- For your app, on that device
  - Copy protection
  - In-App purchase verification

Introduction

- Free or paid
  - In-App Purchases
- Know exactly what the user has paid for

Unified Receipt
on iOS 7 and OS X

Introduction

What's new

- iOS 7
  - Grand Unified Receipt
  - Same receipt format as OS X

- Receipt now includes
  - Volume purchase information
  - Support paid to free with in-app purchase

Introduction

Protect your purchases

- Apple provides you with
  - The receipt format specification
  - The receipt itself
  - Instructions for On-Device Receipt Validation
  - Online service for Server-to-Server Validation

- You chose a security level appropriate for your products
  - You decide the complexity of the implementation

Understanding Receipts

Understanding Receipts

Receipt workflow

- Receipt is issued when
  - App is purchased or updated
  - In-App purchase completed or restored
  - Volume Purchase license revoked
  - On-Demand Refresh API
    - Receipt is not present
    - Receipt is not valid on that device

Understanding Receipts

Inside the receipt

- Certificates and signatures
- Information that ties your app to this device
- Purchase information
  - App and in-app purchases
  - Product, quantity, and version
  - Volume Purchase Program
  - Initial purchase date

Understanding Receipts

Inside the receipt

- Transition from paid to free with in-app purchases
  - Receipt contains the initial purchase date
  - Use this date to determine eligibility for paid content

Transition from iOS 6 to iOS 7

Transition from iOS 6 to iOS 7

- iOS 7 is binary compatible with iOS 6
  - Both receipt formats are issued
  - Both APIs will work
  - iOS 6 receipt API is deprecated

- iOS 7 and OS X manage the receipt for you
  - Receipt is stored on device, in the app bundle

- Supporting both iOS 6 and iOS 7
  - Weak link to iOS 7 API

Transition from iOS 6 to iOS 7

Weak linking

- Example of weak linking

```
NSURL *receiptURL = nil;
NSBundle *bundle = [NSBundle mainBundle];
if ([bundle respondsToSelector:@selector(appStoreReceiptURL)])
{
    receiptURL = [bundle performSelector:@selector(appStoreReceiptURL)]
}
```

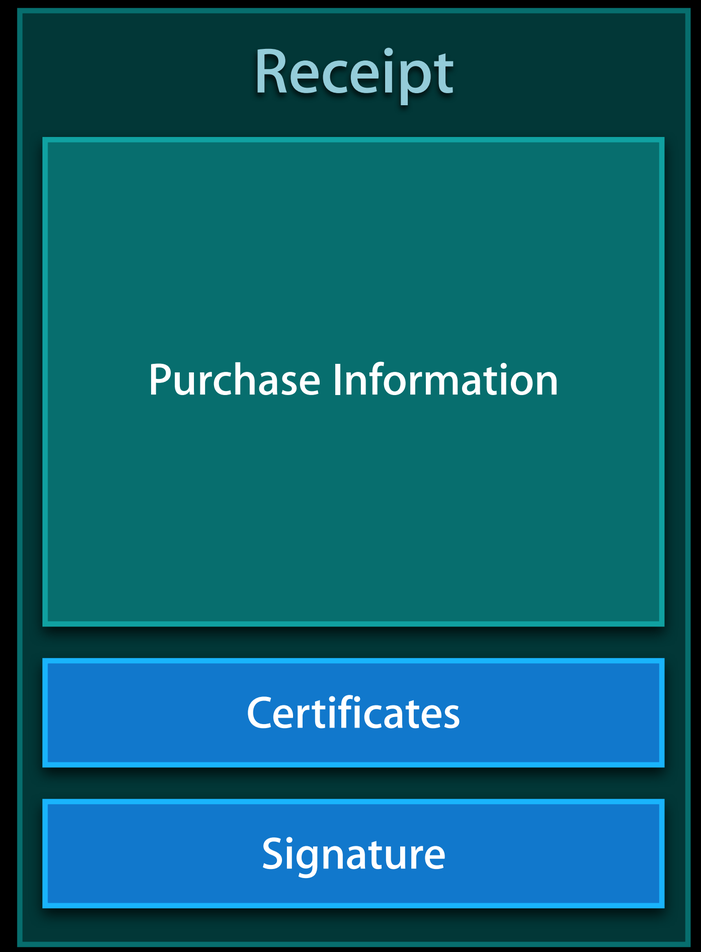
- Do NOT check the system version
  - Use the run-time to determine which API to use

Validating and Inspecting Receipts

Validate On Device

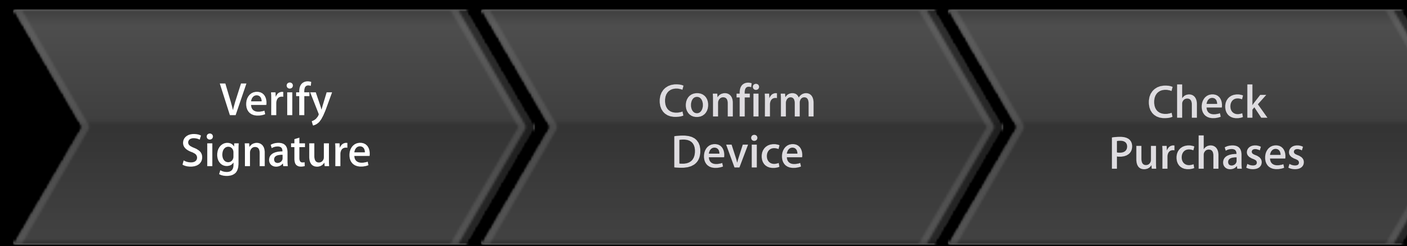
The receipt file

- Stored in the App Bundle
  - API to get the path
- Single file
  - Purchase data
  - Signature to check authenticity



Three Step Process

Validating Receipts



Authentic and trusted

For this device

What the user paid for

Validating Receipts

Authentic and trusted

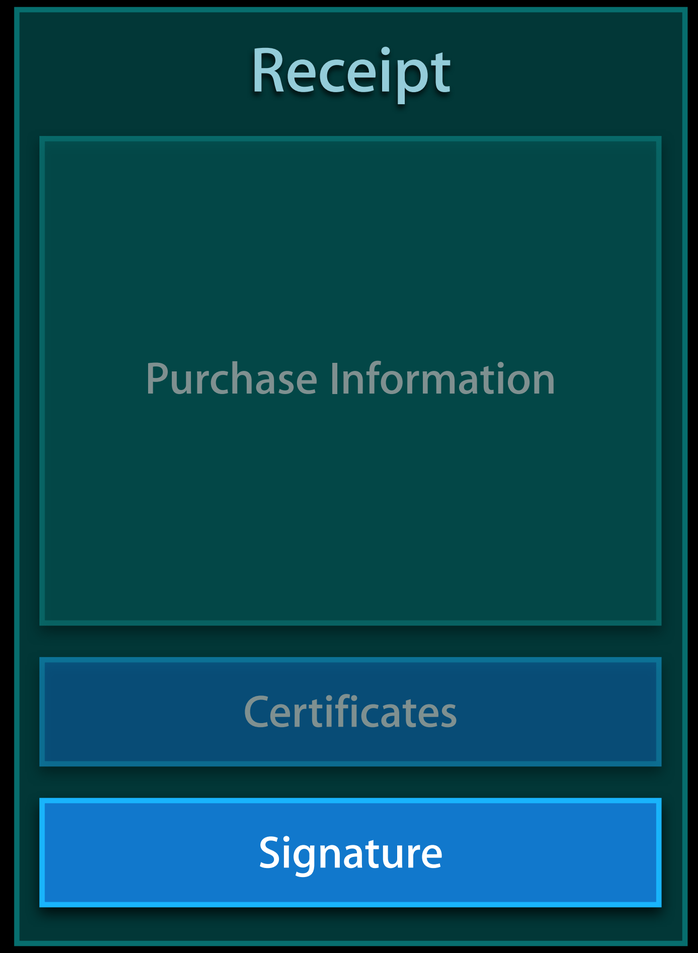
For this device

What the user paid for

Validate On Device

Verify authenticity

- Use signature to confirm the receipt is authentic and unaltered
  1. Locate the file
  2. Read the contents
  3. Verify the signature



- PKCS #7 Container
  - Can use OpenSSL to verify

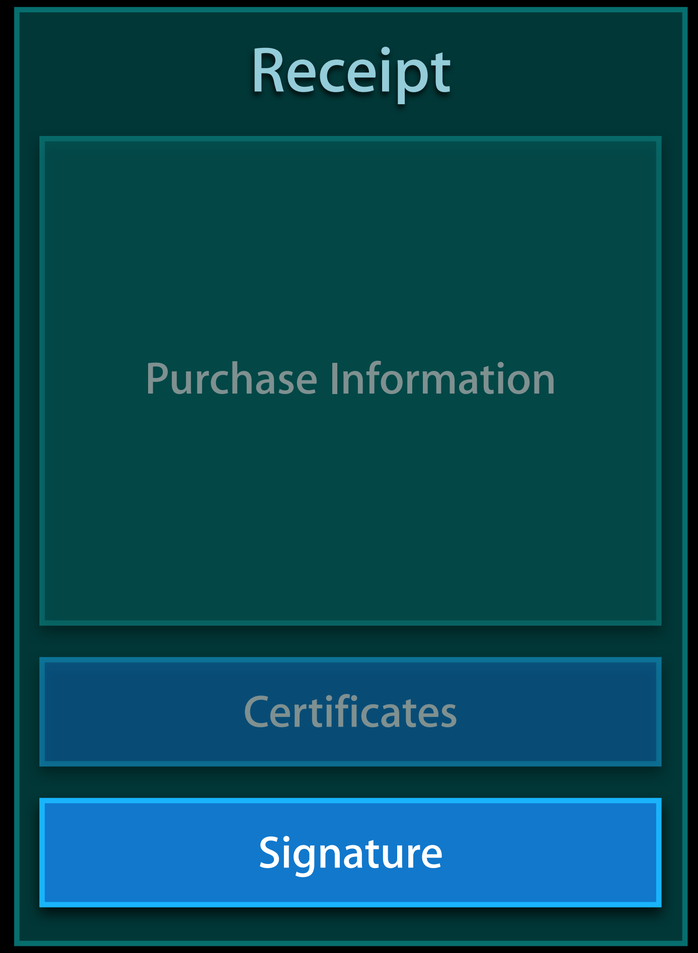
Validate On Device

Verify authenticity

- Use signature to confirm the receipt is authentic and unaltered
  1. Locate the file
  2. Read the contents
  3. Verify the signature

```
// Locate the Receipt
[[NSBundle mainBundle] appStoreReceiptURL];
```

- PKCS #7 Container
  - Can use OpenSSL to verify



Verify Receipt Signature

```
BIO *b_receipt;
BIO *b_x509;
```

Load the Receipt and Apple Root CA Certificate
Binary data from receipt plus certificate

Verify Receipt Signature

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BIO *b_x509;
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Load the Receipt and Apple Root CA Certificate
Binary data from receipt plus certificate

```
// Convert receipt data to PKCS #7 Representation
PKCS7 *p7 = d2i_PKCS7_bio(b_receipt, NULL);
```

Verify Receipt Signature

```
BIO *b_receipt;
BIO *b_x509;
```

Load the Receipt and Apple Root CA Certificate
Binary data from receipt plus certificate

```
// Convert receipt data to PKCS #7 Representation
PKCS7 *p7 = d2i_PKCS7_bio(b_receipt, NULL);

// Create the certificate store
X509_STORE *store = X509_STORE_new();
X509 *appleRootCA = d2i_X509_bio(b_x509, NULL);
X509_STORE_add_cert(store, appleRootCA);
```

Verify Receipt Signature

```
BIO *b_receipt;
BIO *b_x509;
```

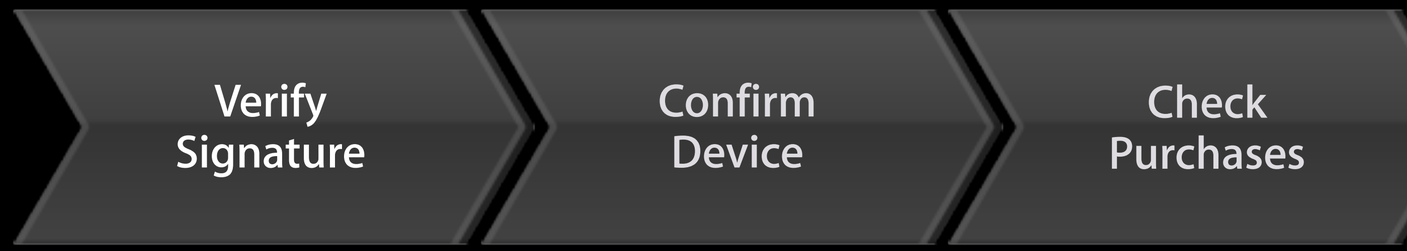
Load the Receipt and Apple Root CA Certificate
Binary data from receipt plus certificate

```
// Convert receipt data to PKCS #7 Representation
PKCS7 *p7 = d2i_PKCS7_bio(b_receipt, NULL);

// Create the certificate store
X509_STORE *store = X509_STORE_new();
X509 *appleRootCA = d2i_X509_bio(b_x509, NULL);
X509_STORE_add_cert(store, appleRootCA);

// Verify the Signature
BIO *b_receiptPayload;
int result = PKCS7_verify(p7, NULL, store, NULL, b_receiptPayload, 0);
if (result == 1)
{
    // Receipt Signature is VALID
    // b_receiptPayload contains the payload
}
```

Validating Receipts



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What the user paid for

Validating Receipts

Authentic and trusted

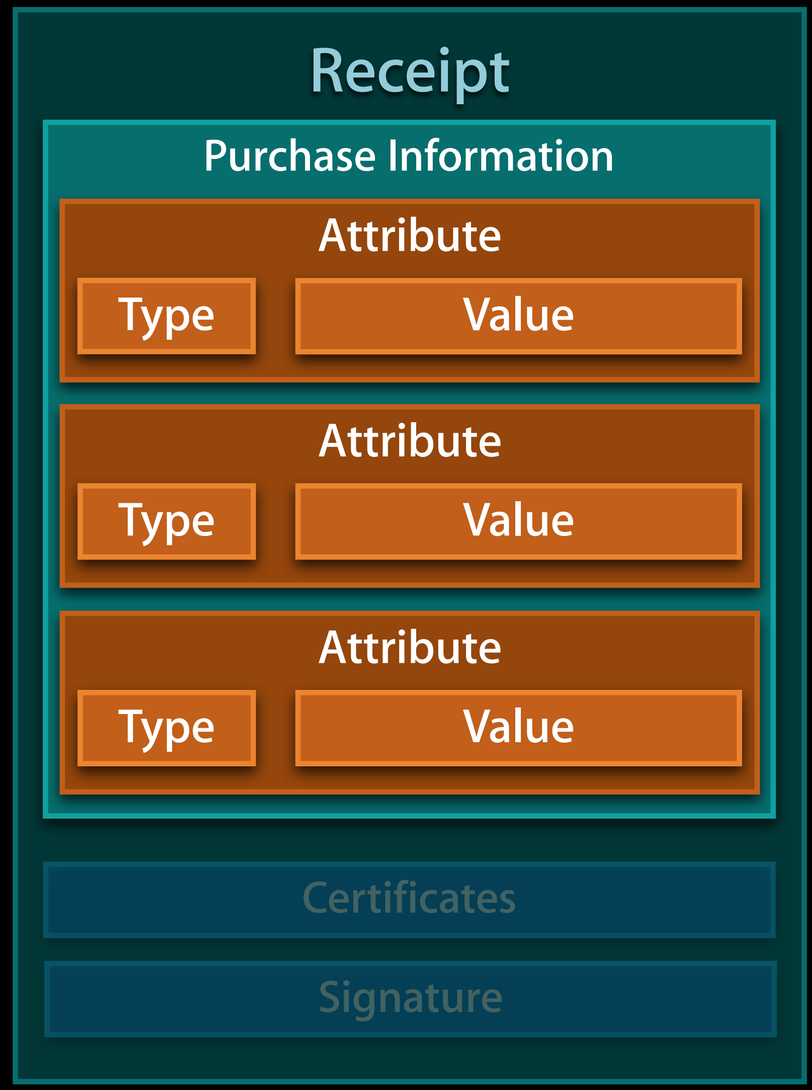
For this device

What the user paid for

Validate On Device

Confirm app and device

- Reading the receipt
- Series of attributes
  - Type, version, value
- ASN.1
  - Abstract Syntax Notation



Reading ASN.1

- Receipt Payload Format Definition

```
ReceiptModule DEFINITIONS ::=
BEGIN

ReceiptAttribute ::= SEQUENCE {
    type    INTEGER,
    version INTEGER,
    value   OCTET STRING
}

Payload ::= SET OF ReceiptAttribute

END
```

- Use asn1c to generate boiler plate code

Reading ASN.1

- Using boiler plate from asn1c

```
Payload_t *payload = NULL;
asn_dec_rval_t rval = asn_DEF_Payload.ber_decoder(NULL,
                                                  &asn_DEF_Payload,
                                                  (void **)&payload,
                                                  pld, pld_sz, 0);

// Walk the attributes
for (i = 0; i < payload->list.count; i++) {
    ReceiptAttribute_t *entry = payload->list.array[i];
    switch (entry->type) {
        case 2: // 2 = Bundle ID
            bundle_id = &entry->value;
            break;
        ...
    }
}
```

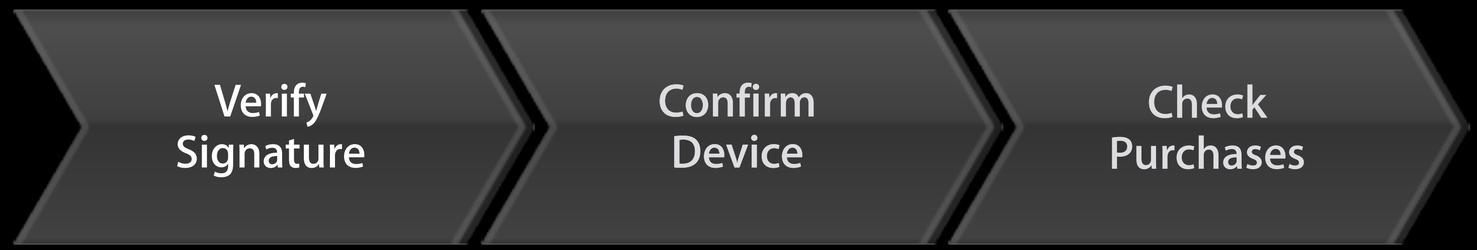
Validate on Device

Confirm app and device

- Check the Bundle Identifier
- Check the Bundle Version

- Check Device Identifier hash
  - iOS - Vendor Identifier
  - OS X - Machine GUID
    - See documentation for Example

Validating Receipts



Authentic and trusted

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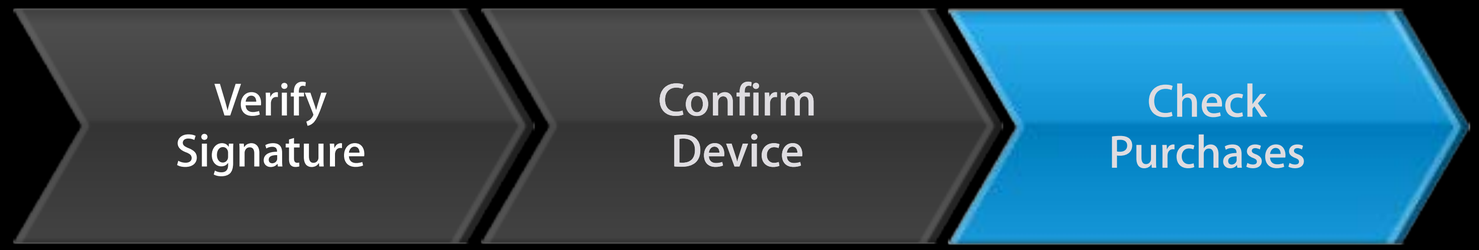
What the user paid for

Validating Receipts



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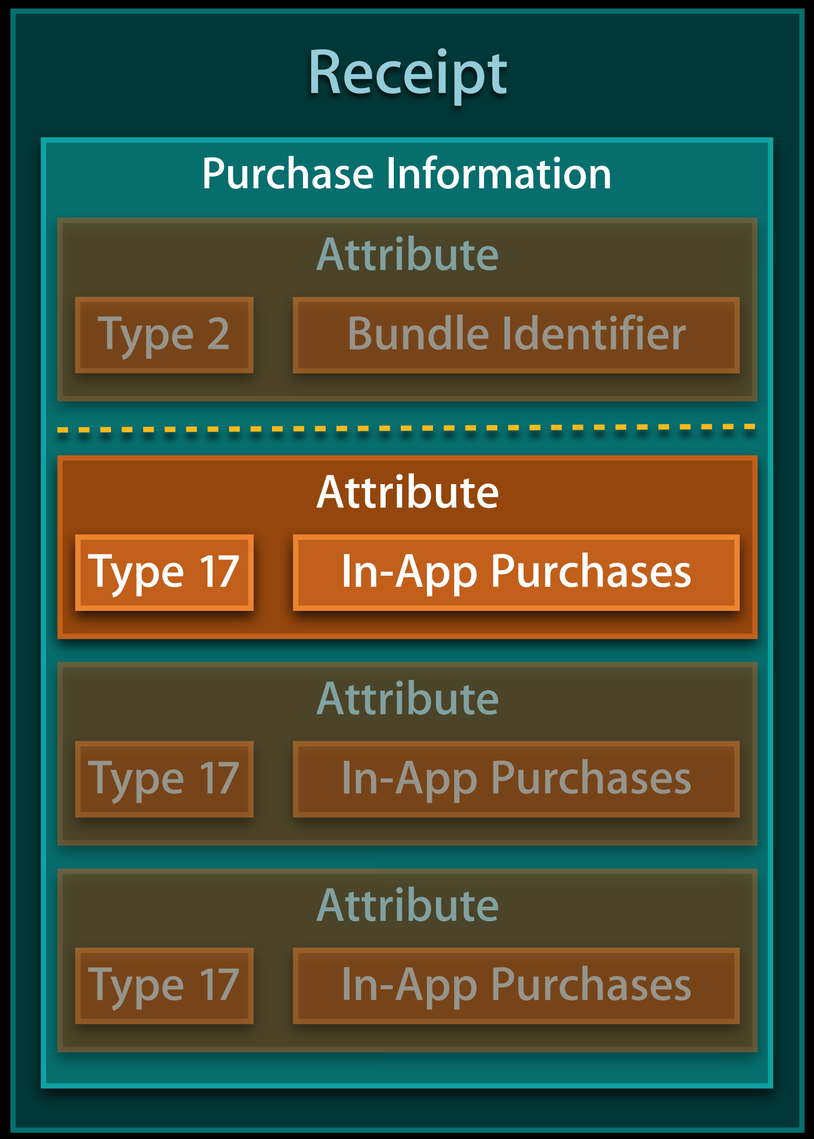
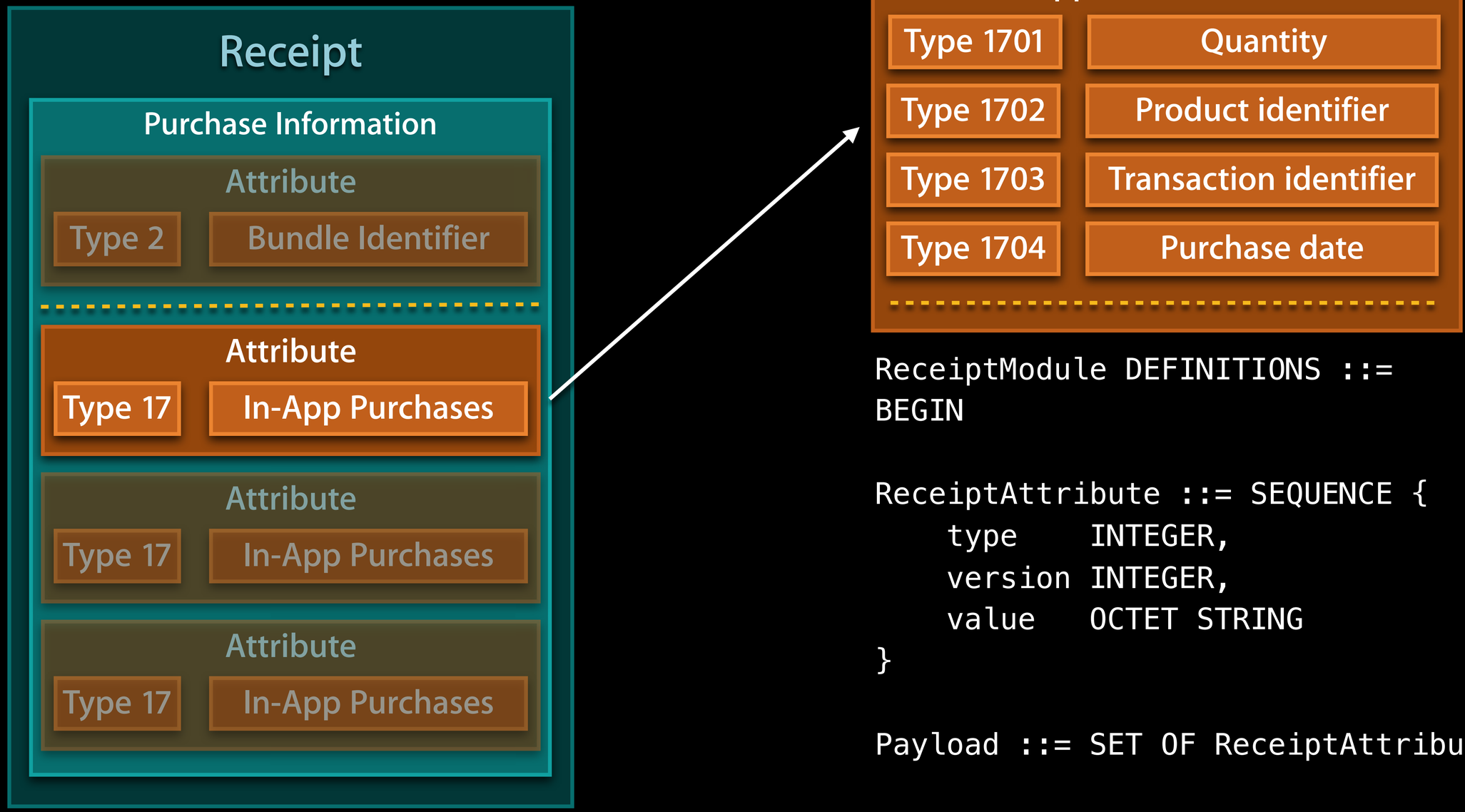
In-App Purchases



In-App Purchases

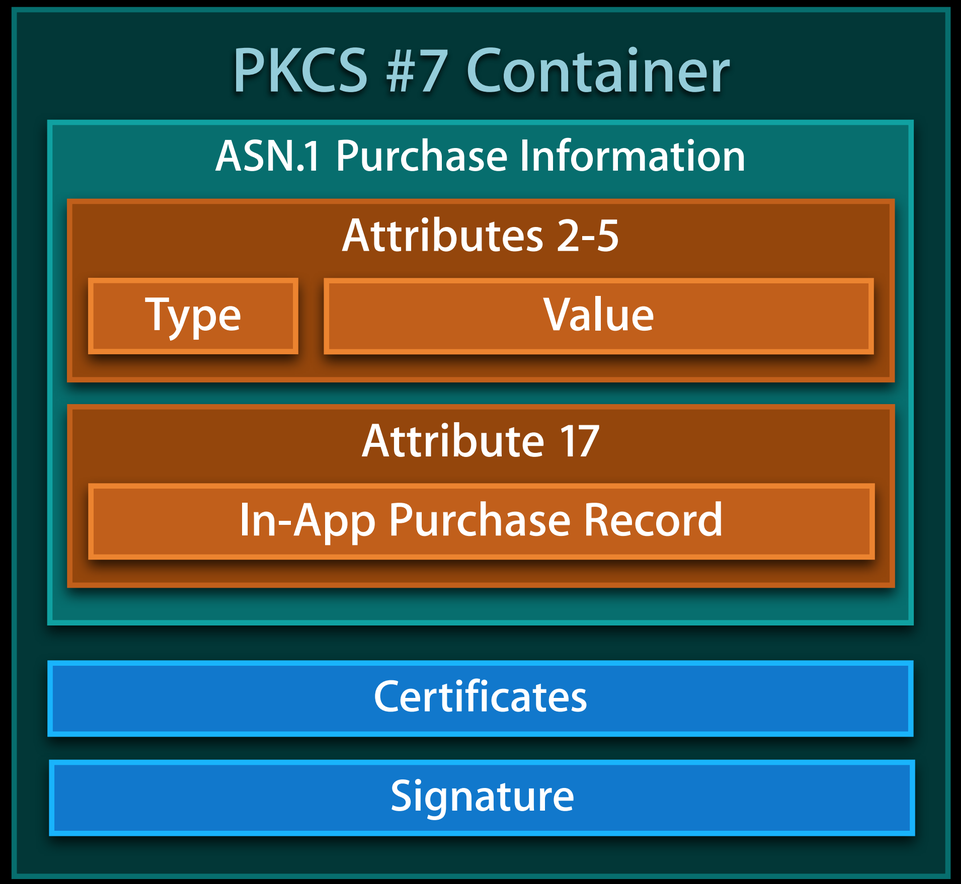



```
ReceiptModule DEFINITIONS ::=
BEGIN

ReceiptAttribute ::= SEQUENCE {
    type    INTEGER,
    version INTEGER,
    value   OCTET STRING
}

Payload ::= SET OF ReceiptAttribute

END
```

Validate On Device

Key technologies

- PKCS #7 Container
  - Signature certificates
    - Verify authenticity
    - OpenSSL can be used
  - ASN.1 format receipt data
    - Use asn1c for boiler plate



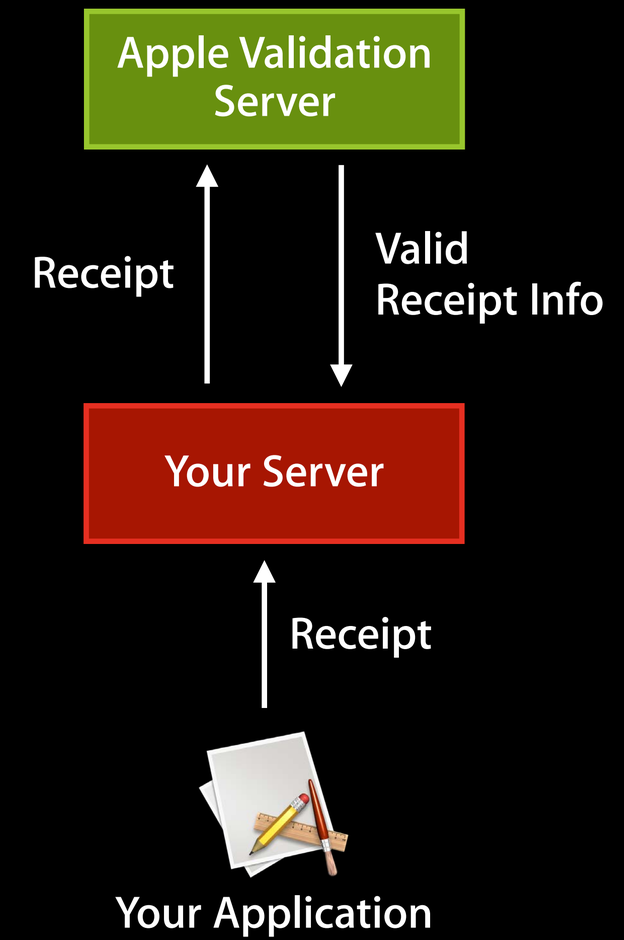
Validate Online

Server-to-Server validation

- Allows your servers to validate the receipt before issuing content

- Send the receipt to your server
  - Not directly from the device
- Your server sends the receipt to Apple

- Apple returns JSON receipt data
- Check purchases, provide content



Implementing Validation

Implementing Validation

On iOS 7

- If the receipt doesn’t exist or is invalid
  - Refresh the receipt using Store Kit

- Receipt refresh will require network
- Store sign-in will be required

Implementing Validation

On iOS 7

- If the receipt doesn't exist or is invalid
  - Refresh the receipt using Store Kit

```
// Refresh the Receipt
SKReceiptRefreshRequest *request = [SKReceiptRefreshRequest alloc] init];
[request setDelegate:self];
[request start];
```

- Receipt refresh will require network
- Store sign-in will be required

Implementing Validation

On OS X

- If the receipt is invalid
  - Exit with code 173 to refresh receipt

- Receipt refresh will require network
- Store sign-in will be required

Implementing Validation

On OS X

- If the receipt is invalid
  - Exit with code 173 to refresh receipt

```
// Receipt is invalid
exit(173);
```

- Receipt refresh will require network
- Store sign-in will be required

Implementing Validation

In-app purchase lifecycle

- Consumable and non-renewing subscriptions
  - Will only appear once
  - In the receipt issued at time of purchase
  - Will not be present in subsequent receipts issued

- Non-consumable and auto-renewable subscriptions
  - Always in the receipt
  - Can be restored via Store Kit API

Implementing Validation

If the receipt is invalid

- Match the user experience to the value
- iOS apps cannot quit but can limit functionality
- OS X apps can quit or keep running

Using the Test Environment

Test Environment

Test Environment

Doesn’t work, says I haven’t paid!

Test Environment

- Test thoroughly
  - No receipt
  - Invalid receipt
    - Valid on refresh
    - Invalid on refresh
  - Volume Purchase Program receipts

Test Environment

Getting a receipt

- iOS Developers
  - Run the app from Xcode
  - Use Store Kit API to get a receipt

- Must be signed with Development Certificate

Test Environment

Getting a receipt

- OS X Developers
  - Build the app in Xcode
  - Run the app from Finder
  - Exit with code 173 to get a receipt
- Must be signed with Development Certificate

Must be signed with Development Certificate

Test Environment

Avoid common mistakes

- Check which profile is being used to sign the app
  - Must be developer signed to use sandbox

- Sign In with Test Environment account
  - Don’t use Production Apple ID

App Submission

App Submission

With receipt validation

- Developers use Developer Certificate and Test Environment
- Store uses Production Certificate and Production Environment

- App review is different
  - Production signed
  - Test Environment
  - Test receipts

- Do not invalidate Test Environment receipts
  - App will be rejected

Summary

Protect Your In-App Purchases

- Verify and inspect the receipt
  - It's your trusted record of purchase
- Choose a model that suits the value of your products
- Validation can be done on-device or server-to-server
- Use Test Environment
  - Developer signed
  - Test Environment accounts

More Information

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App Services Evangelist
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Documentation
Receipt Validation Programming Guide
http://developer.apple.com

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

Labs

Store Kit and Receipts Lab	Services Lab B Thursday 3:15PM

WWDC2013