Working with Game Center

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Better Gaming Experience

Basic and Advanced Features

We Will Use a Sample App

We Will Use a Sample App

What You Will Learn

- Setup
- Leaderboard
- Achievements
- Customization

Setup

Setup
What's needed

- iTunes Connect
- Player authentication

iTunes Connect

iTunes Connect

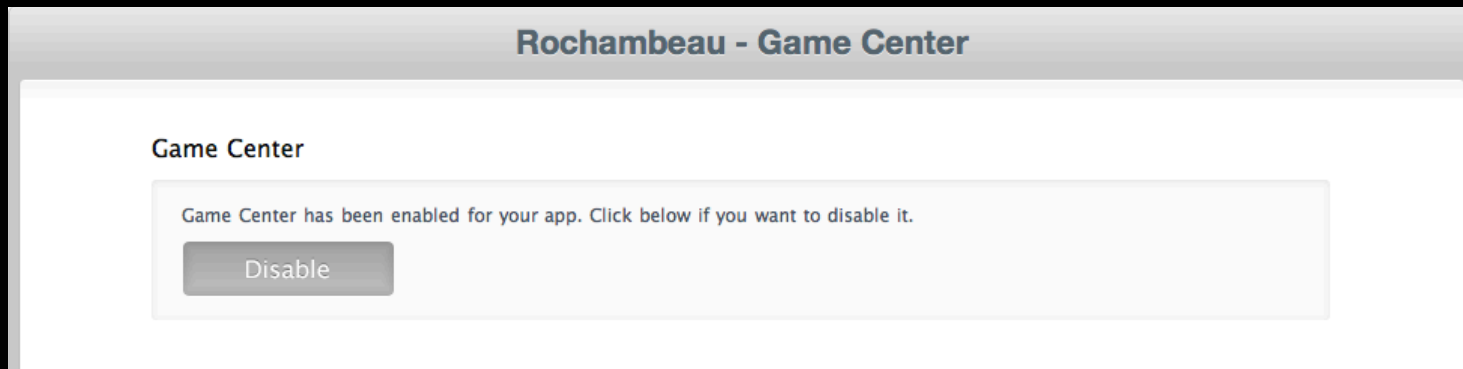**Rochambeau - Game Center**

Game Center

Game Center has been enabled for your app. Click below if you want to disable it.

Disable

Authentication
System wide

• Necessary at launch

Authentication

System wide

- Necessary at launch
- Identifies the player for use in
    - Leaderboards
    - Achievements
    - Friend list
    - Multiplayer
    - Voice chat

Authentication
Accounts

- Game Center handles everything
  - First time sign-up
  - User opt-out
  - Returning player
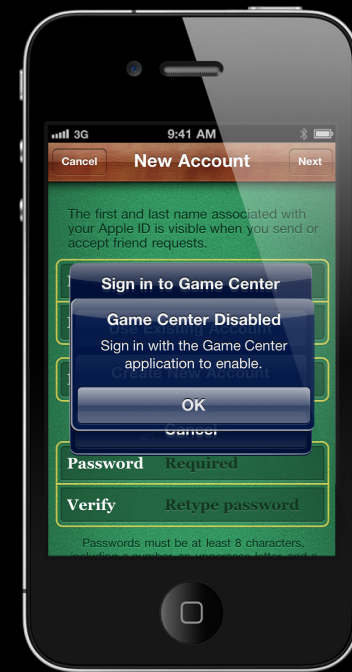
Authentication
Accounts

- Game Center handles everything
  - First time sign-up
  - User opt-out
  - Returning player
- Authentication is required

Authentication

3 steps

- Check for Game Center support

Authentication

3 steps

- Check for Game Center support
- Request authentication

Authentication

3 steps

- Check for Game Center support
- Request authentication
- Check the result

Authentication
Is Game Center API available

```
BOOL isGameCenterAPIAvailable()
{
    // check for presence of GKLocalPlayer API
    Class gcClass = NSClassFromString(@"GKLocalPlayer");

    // check if the device is running iOS 4.1 or later
    BOOL osVersionSupported = ([[[UIDevice currentDevice] systemVersion]
        compare:@"4.1" options:NSNumericSearch] != NSOrderedAscending);

    return (gcClass && osVersionSupported);
}
```

Authentication

```objc
- (BOOL) application:(UIApplication *)application
         didFinishLaunchingWithOptions:(NSDictionary *)launchOptions
....
    if (isGameCenterAPIAvailable())
    {
        GKLocalPlayer *localPlayer = [GKLocalPlayer localPlayer];
        [localPlayer authenticateWithCompletionHandler:^(NSError *err) {
            if (localPlayer.authenticated) {
                // Authentication Successful
            } else {
                // Disable Game Center features
            }
        }];
    }
```

Authentication

Handling multitasking

- Do not manually re-authenticate

Authentication
Handling multitasking

- Do not manually re-authenticate
- CompletionHandler is retained

Authentication

Handling multitasking

- Do not manually re-authenticate
- CompletionHandler is retained
  - Check for new playerID

Authentication
Handling multitasking

- Do not manually re-authenticate
- CompletionHandler is retained
  - Check for new playerID
  - Create new game for new player

Authentication
Avoid using "Enable Game Center?" dialogs

- Creates confusion
  - User may have already authenticated
  - User may have already opted-out
- Game Center is a system-wide service
  - Not intended to have custom enable;
    disable behavior per game

Game Center Enabled

- iTunes Connect
- Authentication

Leaderboards

Leaderboards

Concepts

- A list of players' best scores
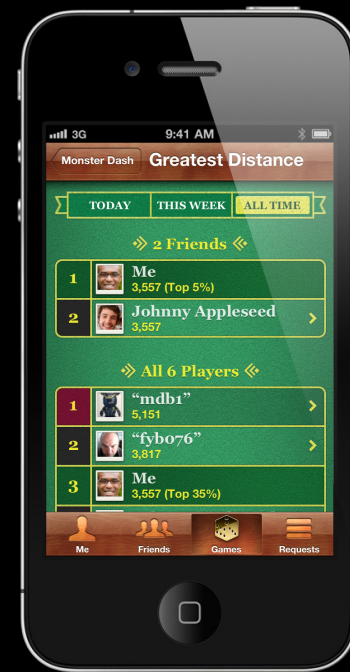
Leaderboards

Concepts

- A list of players' best scores
  - Most wins
  - Best time
  - Highest level

Leaderboards
Concepts

- A list of players' best scores
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Leaderboards
Concepts

- A list of players' best scores
  - Most wins
  - Best time
  - Highest level
- Increases player engagement
- Encourages competition

Leaderboards

Features

• Built-in or Custom UI

Leaderboards
Features

- Built-in or Custom UI
- Filters—by time or audience

Leaderboards
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Features

- Built-in or Custom UI
- Filters—by time or audience
- Combined leaderboards
- Up to 25 leaderboards
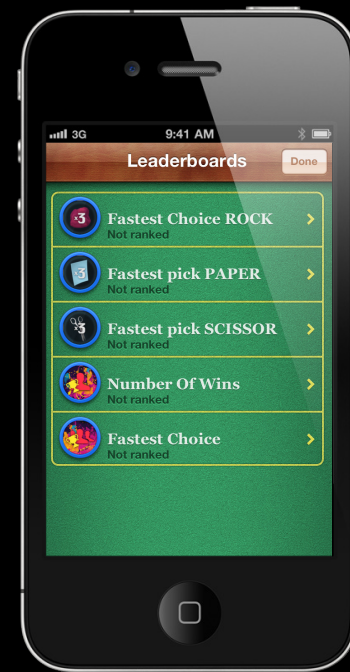
Leaderboards
Features

- Built-in or Custom UI
- Filters—by time or audience
- Combined leaderboards
- Up to 25 leaderboards
- Per score context

Leaderboards

4 Development topics

- Defining leaderboards

Leaderboards

4 Development topics

- Defining leaderboards
- Reporting a score

Leaderboards

4 Development topics

- Defining leaderboards
- Reporting a score
- Presenting the leaderboard

Leaderboards

4 Development topics

- Defining leaderboards
- Reporting a score
- Presenting the leaderboard
- Recommended practices

Defining Leaderboards
Things you'll need

iTunes Connect

Name	FastestChoiceRock
Category ID	com.apple.rochambeau.FastestRock
Score Type	Integer
Sort Order	Low to High
Language	English
Display Name	Fastest Time with Rock
Score Format	100,000,222
Suffix (singular)	" millisecond"
Suffix (plural)	" milliseconds"
Score Range	0 to 9999

Defining Leaderboards
Tips

- Sort order
  - High to Low: Highest scores at top
  - Low to High: Lowest scores at top
- Suffix
  - May require leading space
  - "100 wins" vs "100ms"

Reporting a Score

- Create a GKScore object
  - Initialize with category
  - Set score value
- Report score
  - Submission is asynchronous
- Check for errors

GKScore

category
value
formatted value
date
player ID
rank
Context
setDefault
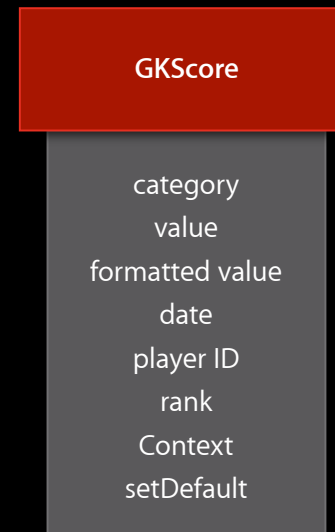
Context

- Identify score int64 value

Context

- Identify score int64 value
- Allows for creative customization

Context

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- Allows for creative customization
- Examples
  - Poker hands

Context

- Identify score int64 value
- Allows for creative customization
- Examples
  - Poker hands
  - Index to server data

Setting Default Leaderboards

- Controls layout
  - Game Center
- Set per score

Reporting a Score

```objc
GKScore* score = [[[GKScore alloc]
    initWithCategory:@"com.apple.rochambeau.FastestRock"] autorelease];
score.value = 1234;   // uint64_t
score.context = updatedStatistics; // uint64_t
[score reportScoreWithCompletionHandler:
    ^(NSError *error) {
        if (error) {
        } else {
            // the score was submitted successfully
        }
    }
];
```

Reporting a Score
Handling errors

- Errors may occur during submission
  - Player not authenticated
  - Game not recognized

Reporting a Score
Handling errors

- Errors may occur during submission
  - Player not authenticated
  - Game not recognized
  - Communications failure
- In case of communications failure
  - iOS 4
    - Store for later resubmission

Reporting a Score
Handling errors

- Errors may occur during submission
  - Player not authenticated
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  - iOS 4
    - Store for later resubmission
  - iOS 5
    - Resubmission handled automatically!

Reporting a Score
Limiting cheating

- Use best practices to prevent cheating
- Could occur by modifying your saved scores file
- ☑ ▪ Add a checksum to the file
- ☑ ▪ Add a hash to the score
- ☑ ▪ Limit score submissions to known "valid" amounts

Displaying Leaderboards
Using standard UI

Displaying Leaderboards
Using standard UI

- Create a GKLeaderboardViewController

Displaying Leaderboards
Using standard UI

- Create a GKLeaderboardViewController

- Set properties

  - Category
  - Time scope
  - Delegate for dismissal

Displaying Leaderboards
Using standard UI

- Create a GKLeaderboardViewController
- Set properties
  - Category
  - Time scope
  - Delegate for dismissal
- Present modally
  - Should use root view controller

Displaying Leaderboards
Using standard UI

```
- (IBAction) showLeaderboard: (id) sender

{
    GKLeaderboardViewController *leaderboardController =
        [[GKLeaderboardViewController alloc] init];


    leaderboardController.category = @"com.apple.rochambeau.FastestRock";

    leaderboardController.timeScope = GKLeaderboardTimeScopeAllTime;

    leaderboardController.leaderboardDelegate = self;


    [self presentViewController: leaderboardController animated:YES
completion:nil];
}
```

Displaying Leaderboards
Using standard UI

```
- (void)leaderboardViewControllerDidFinish:
    (GKLeaderboardViewController *)viewController
{
    [self dismissViewControllerAnimated: YES completion:nil];
}
```

Best Practices
Rotation and presentation

- Be sure your app supports rotation
- If using OpenGL ES
  - Use OpenGL ES template in Xcode 4
  - Use GLKView
  - Use a root view controller

Best Practices
Rotation and presentation

- Be sure your app supports rotation
- If using OpenGL ES
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Leaderboards Review

- Scores
- Context
- Set default leaderboards
- Standard view controller

Achievements

Achievements

Concepts

- Something of significance that is accomplished by the player

Achievements
Concepts

- Something of significance that is accomplished by the player
  - ▪ Completed a challenge
  - ▪ Found the secret passage
  - ▪ Defeated 50 enemies

Achievements

Concepts

- Something of significance that is accomplished by the player

  ▪ Completed a challenge

  ▪ Found the secret passage

  ▪ Defeated 50 enemies

- Increases player engagement

- Encourages competition

Achievements
Features

- Support for 100 achievements

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- Built-in or custom UI
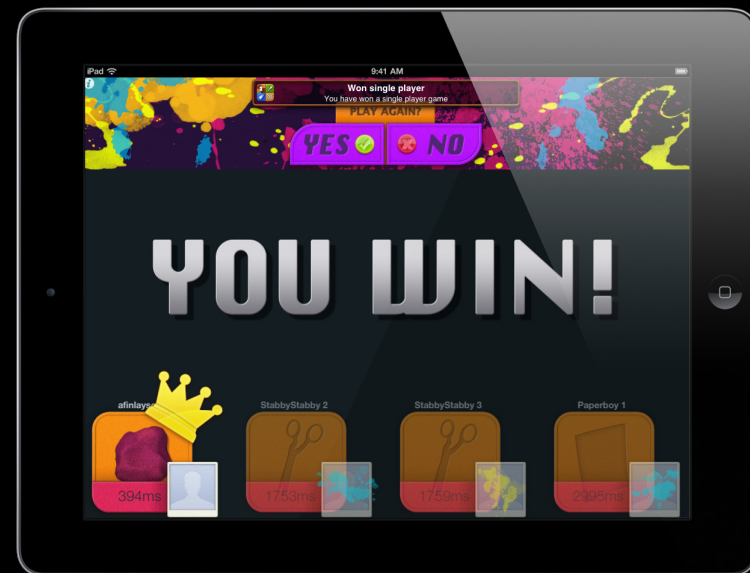- Partial progress—0% to 100%

Achievements
Features

• Support for 100 achievements

• Built-in or custom UI

• Partial progress—0% to 100%

• Hidden achievements

Achievements
Features

- Support for 100 achievements
- Built-in or custom UI
- Partial progress—0% to 100%
- Hidden achievements
- Completion banner

Achievements
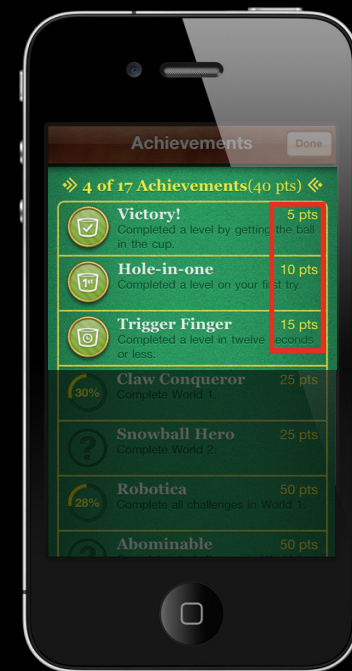## Features

- Support for 100 achievements
- Built-in or custom UI
- Partial progress—0% to 100%
- Hidden achievements
- Completion banner
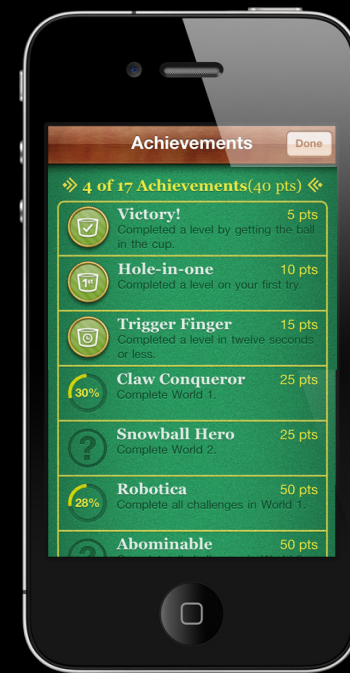- Achievement "points"

Achievement Points

- The player earns points for completing an achievement

Achievement Points

- The player earns points for completing an achievement

  ▪ 0 to 100 points per achievement

  ▪ More difficult achievements should earn more points
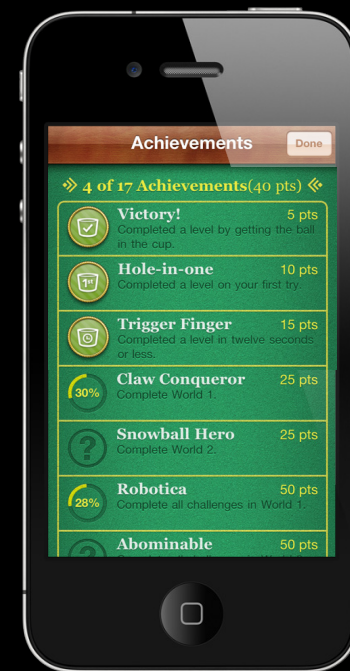
Achievement Points

- The player earns points for completing an achievement
    - 0 to 100 points per achievement
    - More difficult achievements should earn more points
- Maximum budget of 1000 points per title
    - Leave room for expansion
    - Future versions
    - More levels
    - Player feedback

Achievement Points
Achievement Leaderboard

- Shown in Game Center app

Achievement Points
Achievement Leaderboard

- Shown in Game Center app
- New competition to get points

Achievements

5 Development topics

Achievements

5 Development topics

- Define achievements

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- Define achievements
- Report achievements

Achievements

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- Define achievements
- Report achievements
- Present Completion Banner

Achievements

5 Development topics

- Define achievements
- Report achievements
- Present Completion Banner
- KeyValue Data

Achievements

5 Development topics

- Define achievements
- Report achievements
- Present Completion Banner
- KeyValue Data
- Presenting Achievements

Define Achievements
Things you will need

iTunes Connect

Name	Won3Rock
ID	com.apple.rochambeau.Won3Rock
Hidden	No
Point value	100
Title	Won 3 with ROCK
Pre-earned Description	need to win 3 in a row choosing rock
Earned Description	You won 3 in a row choosing rock
Image	

Defining Achievements

Achievement icons

- 512 x 512 pixels
- PNG
- Preferably with alpha
- Gold coin background
- Circular mask applied
- Coin rim overlay

Completion Banner
Displaying completed achievements

- Easy way to alert the user to a completed achievement
- Customize the text via GKNotificationBanner

```
// Completion Banner from Achievement
achievement.showsCompletionBanner = YES;
```

```
// Customized Notification Banner
[ GKNotificationBanner showBannerWithTitle:@"Hint"
    message:@"Getting Closer to an achievement"
    completionHandler:^{} ];
```

Reporting an Achievement

- Create a GKAchievement
  - Initialize with the achievement ID
  - Set percent complete
- Report to Game Center
- Check for errors

GKAchievement

identifier
percent complete
completed?
hidden?
date reported
show banner?

Report an Achievement

```objc
GKAchievement *achievement = [[[GKAchievement alloc]
    initWithIdentifier:@"com.apple.rochambeau.Won3Rock"] autorelease];

achievement.percentComplete = 80.0;

achievement.showsCompletionBanner = YES;

[achievement reportAchievementWithCompletionHandler:^(NSError *error) {
    if (error) {
        // only should occur during development
    } else {
        // submitted successfully
    }
}];
```

Report an Achievement
Handling errors

- Errors may occur during submission
  - Player not authenticated
  - Game not recognized
  - Communications failure
- In case of communications failure
  - iOS 4
    - Store for later resubmission
  - iOS 5
    - Resubmission handled automatically!

KeyValue Data

Across device support

KeyValue Data
Across device support

- Easy to use

KeyValue Data
Across device support

- Easy to use
- Similar to NSUserDefaults

KeyValue Data
Across device support

- Easy to use
- Similar to NSUserDefaults
- Save game states across devices

KeyValue Data
Across device support

5

- Easy to use
- Similar to NSUserDefaults
- Save game states across devices
- Special entitlements needed

KeyValue Data
Across device support

```
//Setting

NSUbiquitousKeyValueStore *store = [NSUbiquitousKeyValueStore
defaultStore];

[store setObject:self.gameState forKey:@"gameData"];

[store synchronize];
```

```
//Getting

NSUbiquitousKeyValueStore *store = [NSUbiquitousKeyValueStore
defaultStore];

[store synchronize];

self.gameState = [store objectForKey:@"gameData"];
```

Displaying Achievements
Using standard UI

- Create a GKAchievementViewController
- Set the delegate for dismissal
- Present modally

Displaying Achievements
Using standard UI

```
- (void)showAchievements
{
    GKAchievementViewController*  achievementsViewController =
        [[[GKAchievementViewController alloc] init] autorelease];
    achievementsViewController.achievementDelegate = self;


    [self presentViewController:achievementsViewController
              animated:YES
             competion:nil];
}
```

Displaying Achievements
Using standard UI

```
- (void)achievementsDidPressDismiss
{
    [self dismissModalViewControllerAnimated:YES];
}
```
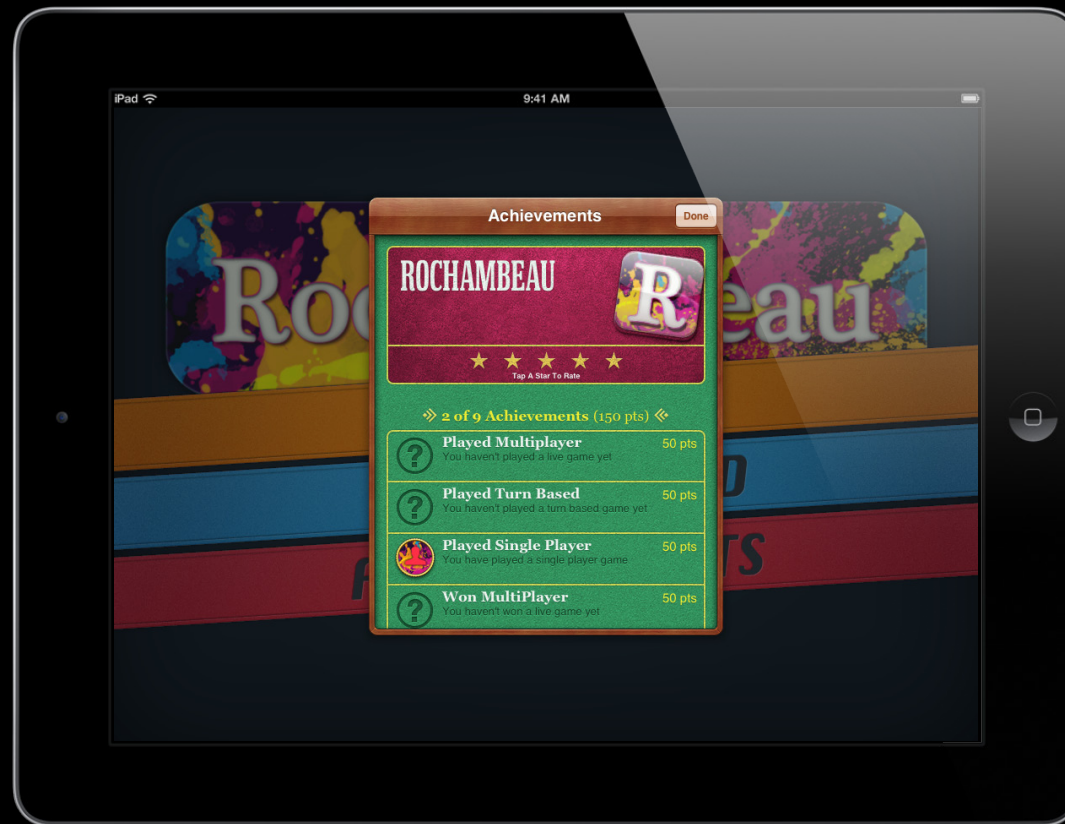
Achievements
Review

- Something of significance that is accomplished by the player
- Create competition between friends
- Completion Banners
- Ubiquitous Key Value Data

Demo

Jordan Ceccarelli
Unlocker of Achievements

Customization

Why Customize?

Customization

- Custom Leaderboards and Achievements
- Photos

Customizing the Experience

- Querying classes
  - GKLeaderboard
  - GKAchievementDescription
  - GKAchievement
- Be creative

Custom Leaderboards

- Leaderboard data may be queried programmatically
    - e.g. for custom display

Custom Leaderboards

- Leaderboard data may be queried programmatically
  - e.g. for custom display
- Typical queries
  - Top 10 scores
  - Ranks N to N+20 on leaderboard
  - Ranks for a list of players

Custom Leaderboards

- Leaderboard data may be queried programmatically
  - e.g. for custom display
- Typical queries
  - Top 10 scores
  - Ranks N to N+20 on leaderboard
  - Ranks for a list of players
- Query results are returned asynchronously
  - Small range expected
  - Low frequency expected
  - Should not query entire leaderboard

Custom Leaderboards

- Create a GKLeaderboard object
- Set properties
  - Category ID
  - Time scope (today/week/all time)
  - Player scope (friends/everyone)
  - Range of ranks desired
- Submit the query
  - Returns an NSArray of GKScores

GKLeaderboard

category
time scope
player scope
title
range
scores[]
context
max range
local player score
loading

Querying a Leaderboard

```
GKLeaderboard* leaderboard = [[[GKLeaderboard alloc] init] autorelease];
```

```
leaderboard.category = @"com.apple.rochambeau.FastestRock";

// interested in friends scores over the past week
leaderboard.timeScope = GKLeaderboardTimeScopeWeek;
leaderboard.playerScope = GKLeaderboardPlayerScopeFriendsOnly;
leaderboard.range = NSMakeRange(1,25);
```

Querying a Leaderboard

```objc
[leaderboard loadScoresWithCompletionHandler:^(NSArray *scores, NSError
*error) {
    if (scores) {
        // display in custom UI
    }
    if (error) {
        // handle error
    }
}];
```
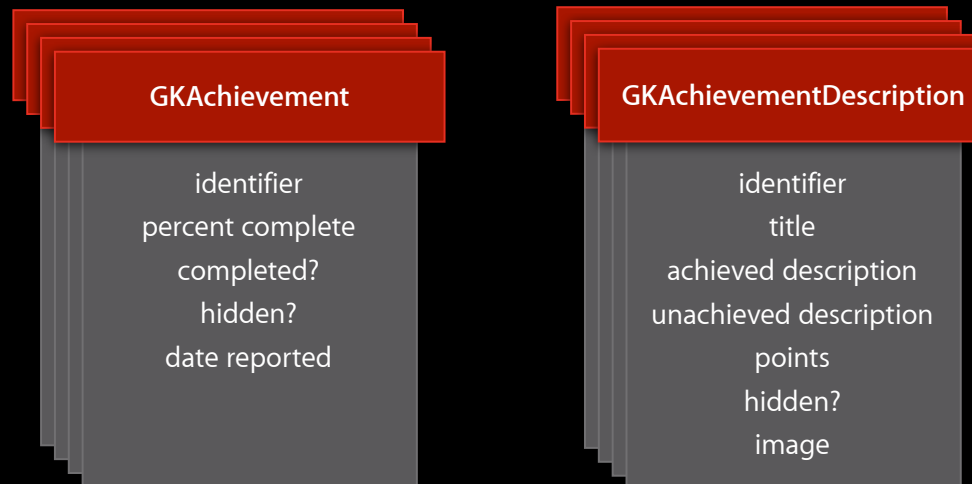
Custom Achievement

Querying Achievements

Two parts

- Loading the player's achievement progress at startup
- Presenting a custom achievements display

GKAchievement

identifier
percent complete
completed?
hidden?
date reported

GKAchievementDescription

identifier
title
achieved description
unachieved description
points
hidden?
image

Querying Achievement Data

```objc
[GKAchievement loadAchievementsWithCompletionHandler:
    ^(NSArray *achievements, NSError *error) {

        if (achievements) {
            for (GKAchievement *achievement in achievements) {
                [achievementsDictionary setObject:achievement
                                           forKey:achievement.identifier];
                NSLog(@"Loaded %@", achievement.identifier);
            }
        } else if (error) {
            [self handleError:error];
        }
}];
```

Querying Descriptions Data

```
[GKAchievementDescription loadAchievementDescriptionsWithCompletionHandler:
    ^(NSArray *descriptions, NSError *error) {
```

```
        if (descriptions) {
            for (GKAchievementDescription *description in descriptions) {
                [descriptionsDictionary setObject:description
                                          forKey:description.identifier];
                NSLog(@"Loaded %@", description.identifier);
            }
        } else if (error) {
            [self handleError:error];
        }
}];
```
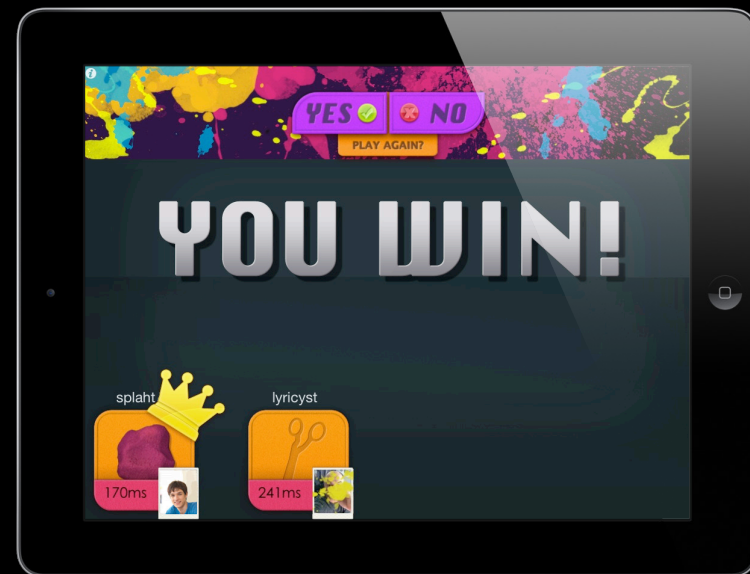
Player Photos

• Available in game

Player Photos

• Available in game

• Easy as
  ▪ Load the player
  ▪ Request the photo
  ▪ Check for errors

Player Photos

- Optional
- Easy to use
  - Load the player
  - Request the photo
  - Check for errors
- Use default image when nothing is returned

Player Photos

```objc
[[[GKLocalPlayer localPlayer] loadPhotoForSize:GKPhotoSizeNormal
withCompletionHandler:^(UIImage *photo, NSError *error) {

    if (portrait)
        [yourImage setImage:photo];
    else
        [yourImage setImage:[UIImage imageNamed:@"defaultImage"]];
}];
```

Customization Review

- Fully extendible Leaderboards and Achievements
- Standout
- Photos

Review

- Leaderboards
  - Context
  - In Game Ratings

Review

- Leaderboards
  - Context
  - In Game Ratings
- Achievements
  - Banners

Review

- Leaderboards
  - Context
  - In Game Ratings
- Achievements
  - Banners
- Customization
  - Photos
  - Custom Leaderboards and Achievements

Related Sessions

Multi-Player Gaming with Game Center	Mission Wednesday 10:15AM
Turn-Based Gaming with Game Center	Misson Wednesday 11:30AM
Introduction to Game Center (Repeat)	Russian Hill Friday 9:00AM

Labs

| GameKit Lab | Graphics, Media & Games Lab A
Wednesday 2:00PM |
| GameKit Lab | Graphics, Media & Games Lab A
Friday 11:30AM |

More Information

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Documentation
Game Center Programming Guide
http://developer.apple.com/devcenter/ios

Getting Started with Game Center
http://developer.apple.com/devcenter/ios/gamecenter/

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