What’s New in Game Center

Session 611

Megan Gardner Software Engineer
Game Center

Social gaming network
Leaderboards
Achievements
Challenges
Multiplayer
iOS, macOS, tvOS, and watchOS
New in Game Center

New way of sending multiplayer invites
New in Game Center

New way of sending multiplayer invites
Big news for the Game Center app
New in Game Center

New way of sending multiplayer invites

Big news for the Game Center app

New API: Persistent Game Sessions
New in Game Center

New way of sending multiplayer invites
Big news for the Game Center app
New API: Persistent Game Sessions
Apple Watch support
New in Game Center

New way of sending multiplayer invites
Big news for the Game Center app
New API: Persistent Game Sessions
Apple Watch support

Game Technologies for Apple Watch

Mission

Friday 3:00PM
Messages-Based Multiplayer Invites

Play with anyone you can message
Game Center Multiplayer
Current state

GKMatchmakerViewController
• Built-in UI
• Invite friends
• Play now (automatch)

GKMatchmaker
• Programmatic API
• Create and process invites
Messages-Based Invites

New integrated Messages View Controller
• Built into GKMatchmakerViewController
• No code changes required

Invite anybody
• Send invites via Messages and iCloud
Messages-Based Invites
Built-in UI
Generates Rich Link
Based on iCloud
Messages-Based Invites

Built-in UI

Generates Rich Link

Based on iCloud
Messages-Based Invites

Built-in UI

Player selects invitees

- Contacts
- Game Center friends
- Nearby
Messages-Based Invites

Built-in UI

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Messages-Based Invites

Built-in UI

Player selects invitees

- Contacts
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Messages-Based Invites

Built-in UI

Send Message

• Can add additional text
• Sends to all players
• Game Center accounts get a notification
Messages-Based Invites

Send Message
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Messages-Based Invites

Built-in UI

Invitee accepts

• Taps the link to accept
• Takes into the game
  - Or App Store if game is not installed
Messages-Based Invites
Built-in UI

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Messages-Based Invites

Shown with invite

Filename: GKMessageInvite.png

Height and Width: 150px - 960px
Game Center Friends

Friends list frozen
- No longer a prerequisite for multiplayer
- Friends visible in Recent Players tab

GKFriendRequestComposeViewController deprecated
- Allowed apps to present UI to send friend requests
- Rarely seen
Game Center App
Game Center App

- Manage account
- Manage friends
- Browse games list
- Browse leaderboards
- View achievements
- View challenges
- View turns
Game Center App

- Manage account
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Game Center App

Manage account
Manage friends
Browse games list
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# Game Center in iOS

<table>
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<td>Manage friends</td>
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<td>View achievements</td>
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<td>GKTurnBasedMatchmakerViewController</td>
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Game Sessions
A brand new way to multiplayer
Game Center Multiplayer

Real-time

• Connects 2-4 players
• Requires all players to keep running app
• Peer-to-peer connections for duration of match

Turn-based

• Connects 2-16 players
• Formal passing of turns among players
• Games stored by Game Center until aged out
Game Sessions

iCloud-based multiplayer

Generalized interface for saving and sharing game data
Easily sharable instances
Flexible game structure
Real time session streams
Play with anyone
Game Sessions

Data and Player
Game Sessions
Data and Player

Game Data
Game Sessions
Data and Player

Player 1

Game Data
Game Sessions

Multiple players

Game Data

Player 1

Player 2

Player 3

Player 4
Game Sessions

Message passing

Diagram:
- Game Data
- Player 1
- Player 2
- Player 3
- Player 4
Game Sessions
Message passing

Game Data

Player 1
Player 2
Player 3
Player 4
Game Sessions
Message passing

![Diagram showing game sessions with message passing]

- Player 1
- Player 2
- Player 3
- Player 4

Game Data
Game Sessions
Message passing

![Diagram showing game sessions with message passing]

- Player 1
- Player 2
- Player 3
- Player 4

Game Data
Game Sessions

Badging

Player 1

Game Data

Player 2

Player 3

Player 4
Game Sessions

Badging

Diagram:
- Player 1
- Player 2
- Player 3
- Player 4
- Game Data

Connections:
- Player 1 to Game Data
- Player 2 to Game Data
- Player 3 to Game Data
- Player 4 to Game Data
Game Sessions
Many players
Game Sessions

Many players
Game Sessions
Many sessions
Game Sessions
Real-time streams

Game Data
Player 1
Player 2
Player 3
Player 4
Game Sessions

Real-time streams

Player 1
Player 2
Player 3
Player 4

Game Data
Game Sessions
Real-time streams

- Player 1
- Player 2
- Player 3
- Player 4
Game Sessions
Real-time streams
Classes

GKGameSession
- Interact with session data

GKCloudPlayer
- Player in a GKGameSession

GKEventListerner
- Notify when events happen on a session

GKGameSessionError
- Errors we can get from sessions
GKGameSession
GKGameSession
API overview

Create a session, delete a session, get session list
Load game data, store game data, resolve conflicts
Share session, add players, remove players, get player list
Send notification messages, set and clear badges
Join real-time stream, leave stream
Send and receive data within stream
GKGameSession

Details

Game data
- Store up to 512KB game data
- Stored in users iCloud
- Follows Cloud Kit conventions

Messages and Badges
- Game Center Notifications
- Badging controlled by developer

Real-time streams
- Leverages Apple infrastructure
Creating a Session

What you’ll need

Title
• Name for the session

Container ID
• Allows sharing session among multiple games

Max streaming players
• Up to 16

+ (void)createSessionInContainer:(NSString *)containerName withTitle:(NSString *)title maxConnectedPlayers:(NSInteger)maxPlayers completionHandler:(void(^)(GKGameSession *session, NSError *error))completionHandler;
Session Data

Loading and saving

Any player in session can access game data
Metadata also provided
- Last modified date
- Last modified player

// Load game data
- (void)loadDataWithCompletionHandler:(void (^)(NSData *data, NSError *error))completionHandler;
Session Data

Loading and saving

Simple method for storing data

- Up to 512KB

// Save game data
- (void)saveData:(NSData *)data completionHandler:
  (void (^)(NSData *conflictingData, NSError *error))completionHandler;
Session Data

Loading and saving

Simple method for storing data

• Up to 512KB

// Event Listener
- (void)session:(GKGameSession *)session
  player:(GKCloudPlayer *)player
didSaveData:(NSData *)data;
Session Data

Loading and saving

Save conflicts may occur

• App must resolve and resave

• Possible for resolved data to still be conflicted

• Continue to resolve, and attempt to resave until no error is returned

Game Data

Player 1

Player 2

Player 3
Session Data

Loading and saving

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Session Data

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![Diagram showing relationships between players and game data]
Session Data

Loading and saving

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• App must resolve and resave
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Sharing a Session

Adding a player

Any player can invite other players to join a session

Provided via unique session “URL”

Send via iMessage, Email, Twitter

Recipient joins session by tapping link
Sharing a Session

Adding a player

Diagram:
- Player 1
- Game Data
Sharing a Session
Adding a player

iMessage

To: Player 2

Hey, want to play?
http://www.icloud.com/URL

Player 1

Game Data
Sharing a Session

Adding a player

**iMessage**

To: Player 2

Hey, want to play?
http://www.icloud.com/URL
// Sharing a Session

// Get URL for this session
- (void)getShareURLWithCompletionHandler:(void(^)(NSURL *url, NSError *error)) completionHandler;

// Event Listener
- (void)session:(GKGameSession *)session didAddPlayer:(GKCloudPlayer *)player;
GKCloudPlayer

Each player is a GKCloudPlayer
• PlayerId unique to app container
• DisplayName

Not a GKPlayer object
• Only for use with GKGameSessions
• Not for GKScore, GKAchievement…
Getting Cloud Players

Get current player
• See who owns the session

Get players in session
• Send messages and set badges

// Player Signed into iCloud on device
+ (void)getCurrentSignedInPlayer:(void(^)(GKCloudPlayer *player, NSError *error))handler;

// Players current in Session
@property (nonatomic, readonly) NSArray<GKCloudPlayer *> *players;
Messages and Badges
Sending and Receiving Messages

Overview

Messages arrive as Game Center Notifications
All players can send messages at any time
Messages are localizable
Can send relevant data
Optional badging for message recipients
// Sending Messages

-(void)sendMessageWithLocalizedFormatKey:(NSString *)key
    arguments:(NSArray<NSString *> *)arguments
    data:(NSData *)data
    toPlayers:(NSArray<GKCloudPlayer *> *)players
    badgePlayers:(BOOL)badgePlayers
    completionHandler:(void(^)(NSError *error))completionHandler;

// Event Listener on Receiving side

-(void)session:(GKGameSession *)session didReceiveMessage:(NSString *)message withData:(NSData *)data fromPlayer:(GKCloudPlayer *)player;
Badges

Badge may be included with message
One badge increment per session
App icon will show overall tally

// Clear badges programmatically
- (void)clearBadgeForPlayers:(NSArray<GKCloudPlayer *> *)players completionHandler:(void (^)(NSError *error))completionHandler;
Managing Sessions
Loading Sessions

Load all sessions local player is a part of

+ (void)loadSessionsInContainer:(NSString *)containerName completionHandler:(void(^)(NSArray<GKGameSession *> *sessions, NSError *error))completionHandler;

Load the data and players for a specific session

+ (void)loadSessionWithIdentifier:(NSString *)identifier completionHandler:(void(^)(GKGameSession *session, NSError *error))completionHandler;
Deleting a Session

Removes player from a session they do not own

Deletes session data if originating player

```c
+(void)removeSessionWithIdentifier:(NSString *)identifier completionHandler:(void(^)(NSError *error))completionHandler;
```

Event Listener

```c
-(void)session:(GKGameSession *)session didRemovePlayer:(GKCloudPlayer *)player;
```
Game Session Streams
Game Session Streams

Overview

Connect to current players
See status of players in connection
Send data to all players in connection
Add and drop players without restarting connection
Connection State

Setting state automatically creates connections
Will fail if max players has already been reached

- (void)setConnectionState:(GKConnectionState)state completionHandler:(void(^)(NSError *error))completionHandler;

Show players with specific state

- (NSArray<GKCloudPlayer *> *)playersWithConnectionState:(GKConnectionState)state;

Event Listener

- (void)session:(GKGameSession *)session player:(GKCloudPlayer *)player
  didChangeConnectionState:(GKConnectionState)newState;
Sending Stream Data

Data sent to all connected players

Reliable or unreliable transport

- (void)sendData:(NSData *)data withTransportType:(GKTransportType)transport completionHandler:(void(^)(NSError *error))completionHandler;

Event Listener

- (void)session:(GKGameSession *)session didReceiveData:(NSData *)data fromPlayer:(GKCloudPlayer *)player;
Game Session Examples
Turn-Based Game

Example

Game Data

Player 1
Player 2
Player 3
Player 4
Turn-Based Game

Example

Game Data

Player 1

Player 2

Player 3

Player 4
Turn-Based Game

Example

- Player 1
- Player 2
- Player 3
- Player 4
Turn-Based Game

Example

Game Data

Player 1
Player 2
Player 3
Player 4
Turn-Based Game

Example
Real-Time Game

Example
Real-Time Game

Example

![Diagram of a real-time game with four players connected to a central game data node.]
Real-Time Game

Example

Diagram showing connections between four players (Player 1, Player 2, Player 3, Player 4) and a central Game Data node.
Real-Time Game

Example
Real-Time Game

Example
Real-Time Game

Example

![Game Data Diagram]

- Player 1
- Player 2
- Player 3
- Player 4
Real-Time Game

Example

![Diagram showing a network of players connected to Game Data](image-url)
Players trading cards

- Players want to trade with others during their turn
- Send a message with relevant data
- Players can respond with their own offers
- Resolve on the current players device, finish turn, and save data
Game Sessions

Use case: complex turns

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Use case: mid-stream join multiplayer

Invite many people to the session
Start a stream
Another player joins, enter a fight
As soon as one player is eliminated, the next is allowed to connect, and fight
No wait between fights, connections happen automatically
Game Sessions

Use case: mid-stream join multiplayer

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Game Sessions
Use case: assisted single player

Playing a single player platformer
Can’t get past a level
Share game with another player, allow them to help you advance
Game Sessions

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Game Sessions

Summary

Play with anyone
More flexible game structure
Simple multiplayer connections
New possible game styles
What’s New in Game Center

Message based multiplayer invites
Removed Game Center app
Persistent Game Sessions
Apple Watch support
More Information

https://developer.apple.com/wwdc16/611
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