

# Online Features for Programmers

## *Crash Course*



# Everyone Connects



# Platform Power

Connect Features



Cheap, Scale and Fast

Abuse Platform Freebies

Little Bits = Big Features

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# Trophies

Universal and Fixed



Query friend trophies

Social messaging & features

Trophies for Matching

Shared Social Landmarks

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# Leaderboards

Persistent Networked State



Platform: Fixed or Flexible

Data != UI

Safety Check: Simple Checksum

Binary Attachment

Plan for Leaderboard Issues: Bugs  
& Hacks

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# REST API Curl Example

Platform Services via HTTP calls



## Curl, Postman & Wireshark

```
curl -i -X POST -H  
"Content-Type:application/json"  
http://localhost:8888/endpoint/ -d  
'{"key1":"MyData",  
"base64eg":"8J+SqfCfkqnwn5Kp8J+SqQ=="}'
```

# REST Unity Example

Platform & Middleware helps



Beware hidden allocations

```
WWWForm form = new WWWForm();  
form.AddBinaryData("fileUpload", bytes,  
"screenShot.png", "image/png");  
  
WWW w = new WWW(screenShotURL, form);  
yield return w;  
if (!string.IsNullOrEmpty(w.error))  
    print(w.error);  
else  
    print("Finished Uploading Screenshot");  
yield return null;
```

Ripe for optimisations

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# Realtime





# Sockets

Setup, Listen, Loop



TCP, UDP, Reliable UDP

WebSockets

Gotcha: Concurrency

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# Implicit

Generic Replication System



Unity / Unreal Default

Only Replicate what you need

State Heavy Bandwidth Hog

Gotcha: Beware 0/NULL not being replicated

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# Input Only

Perfect Prediction



Copy and send timestamped inputs

Low Bandwidth

Gotcha: Sensitive to spikes, rewind state

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# Alt Facts

Networking is all a Lie



Relative Target Aim

Smoothing and Correction

Projectile Motion

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# Roll your Own

Mix & Match as Required



Don't reinvent the wheel

Understand your Game State

Can you Rewind / Replay

Write per Object or Class  
optimisations

Different Channels

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# Compression

Send Less. Do More



Throw Away Data

C++ Union

Domain Specific Compression

Compressor Head videos

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# Social



# Messaging

Sealed with a Loving Kiss



Animal Crossing Present

Message Systems

Forums & Communities

Shout Boxes

GOTCHA: Moderation

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# Help Share Sharing

Improve your Screenshots & Video

Meta-Data and Tagging

Finding Content Online

Prime the Social Pump

Auto Caption



# Config in Cloud

Patching is hard, config is simple



Simple Config as JSON blob

Rebalance on Fly

Unlock or Trigger Events

Gotcha: Local Version, Version Control, Mid-game saves

**NO EXECUTION**

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# Platform Data

Tiny Bit, Big Feature



Binary Data Dump

Bonus Points: Friends & Revisions

Atomic Access

Trading & Loot Systems

Seasonal Events

User Generated Content

Player Sign posts

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# Online Saves

Never lose Progress



Sanity Check: Versions & Buffered

Small Increments & Cherry Pick

Trophy Resolving

Save Delta

Backup & Cheating

Fallback: Always Ask

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# Getting Together



# Community

We all play your Game



Stranger - Acquaintance - Friend

When are we going to play

IRC or Community Chat

Social API

Events & Calendar

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# Social Matchmaking

Every match is a Story



Graphs are your Friend

Build a Shared Story

Spectate Ongoing Matches

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# Invites

Optimized Flow = Better Multiplayer



Craft a good invite and handle early

Bootstrap State

Load only what you need

Death to the Dull Lobby

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# Matchmaking

Concurrency is King



Peak Concurrency

Actionable Information

Drop in is Queen

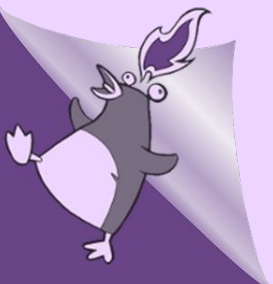
Gotcha: Buckets Split Audience

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# Illustration: Concurrency, Session Time & Drop In

Pausing, Known State & Replays

[[ Insert Image ]]



# Servers



# Peer to Peer

Keep it Cheap



Technical Complexity

Sub-Optimal Topologies

Use Existing Frameworks

NAT Punchthrough

Does everyone need to know everything?

Often the Correct Solutions

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# Tiny Server

Low Risk, Big Power



Simple NodeJS / GoLang Server

Your own REST server

Server Down Impact

Tests & Restarts

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# Infrastructure

Battery or Power Grid



Running Game State on Server is  
EXPENSIVE AS HELL

Player Servers

Local for Development

Configuration Outperforms Single  
Thread

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# Cheaters

State Verification

Building Peer Trust

Replay Verification

Machine Learning

Worst Case



# Moving to Cloud

Someone else's Machine



Small Server + P2P / Player Servers

Compare Service Providers

Understand the Platform offering

Dev Ops

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# Conclusion

REST & Platform Features

Social

Realtime

Servers

**Research 2 Things**



# Questions?



Feedback Please

Crash Course in Online Features for Programmers

Claire Blackshaw - Senior Online Consultant - Sony

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