Game Developers Conference®

February 28 - March 4, 2011
Moscone Center, San Francisco

www.GDConf.com

UBM

Scaling Social Games

What Game Development Can Learn from the Cloud

Dan Borthwick - Common Technology Lead
Playfish / EA

playfish

MONOPOLY
MILLIONAIRES

RESTAURANT
CITY

MADDEN
SUPERSTARS
EA SPORTS
NFL PLAYERS

FIFA
SUPERSTARS

pet
society

MY
EMPIRE

What makes a Playfish game?

- Free to play
- Social
- Games as a service
- Micro-transactions

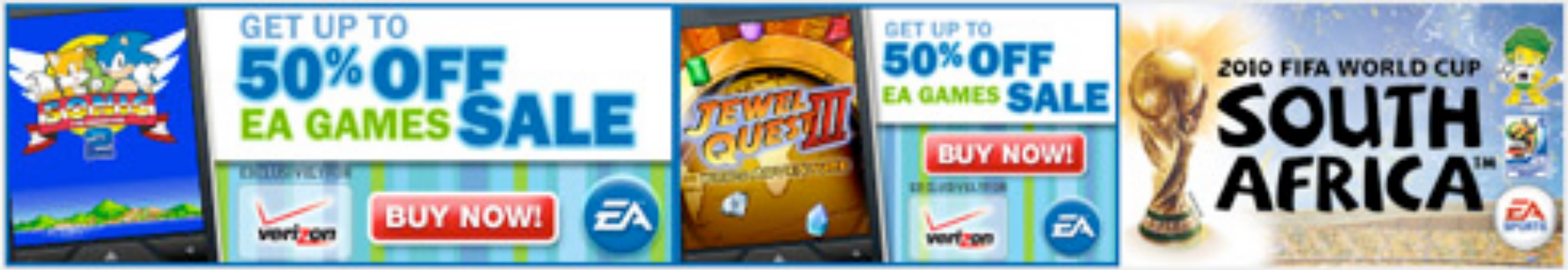
playfish

scalability

“the ability to adapt to increased demands”

verizon wireless

Music & Tones | Games | Apps | Wallpapers | Manage | 0



Browse Store

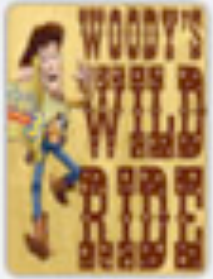
Games

- All Games
- Verizon Exclusives
- Puzzle/Word
- Sports/Racing
- Classic/Arcade
- Music/Rhythm

NEW GAMES

SEE ALL

Hero Tactics



Toy Story 3 Woody's Wild...

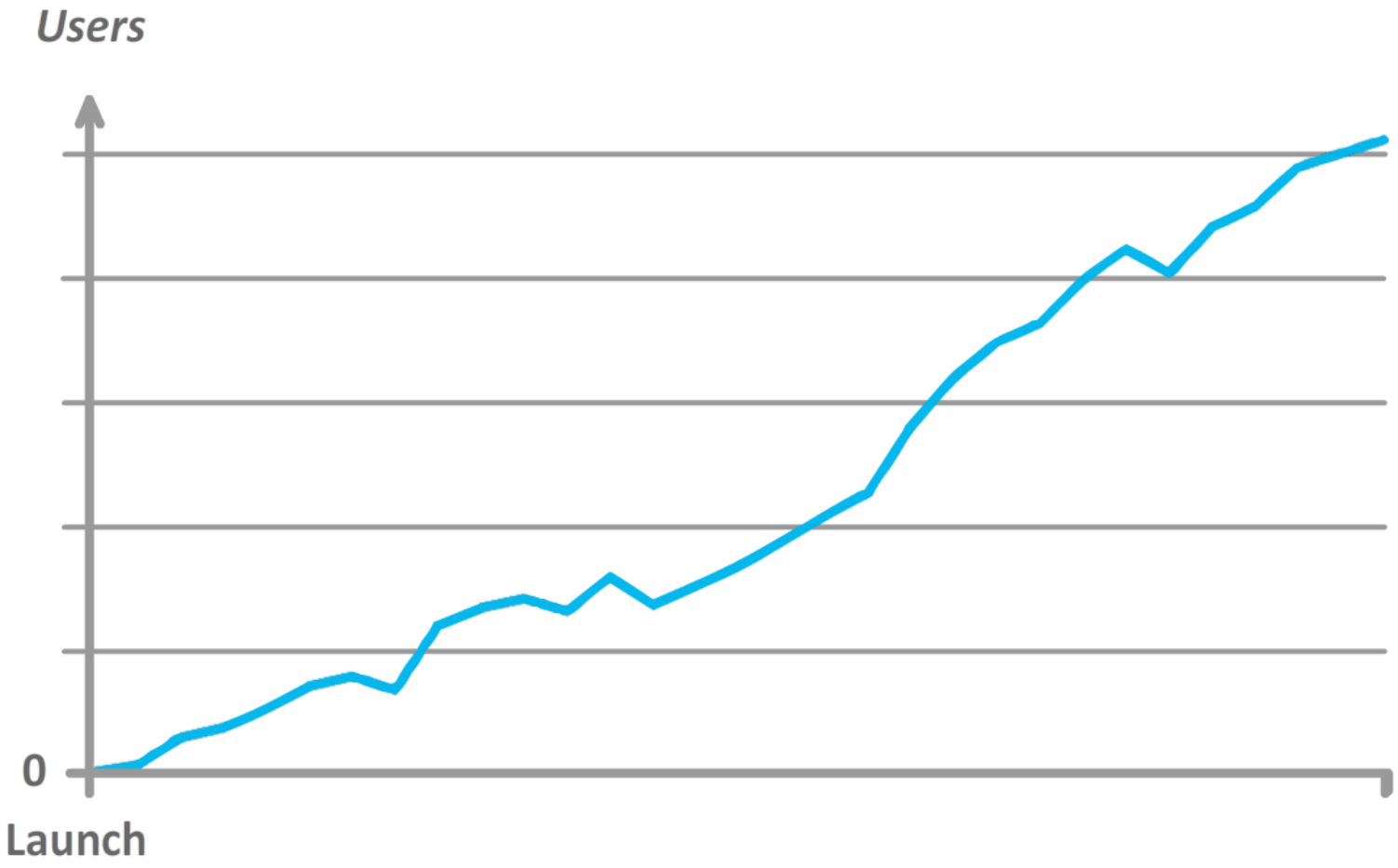
Tournament Blackjack

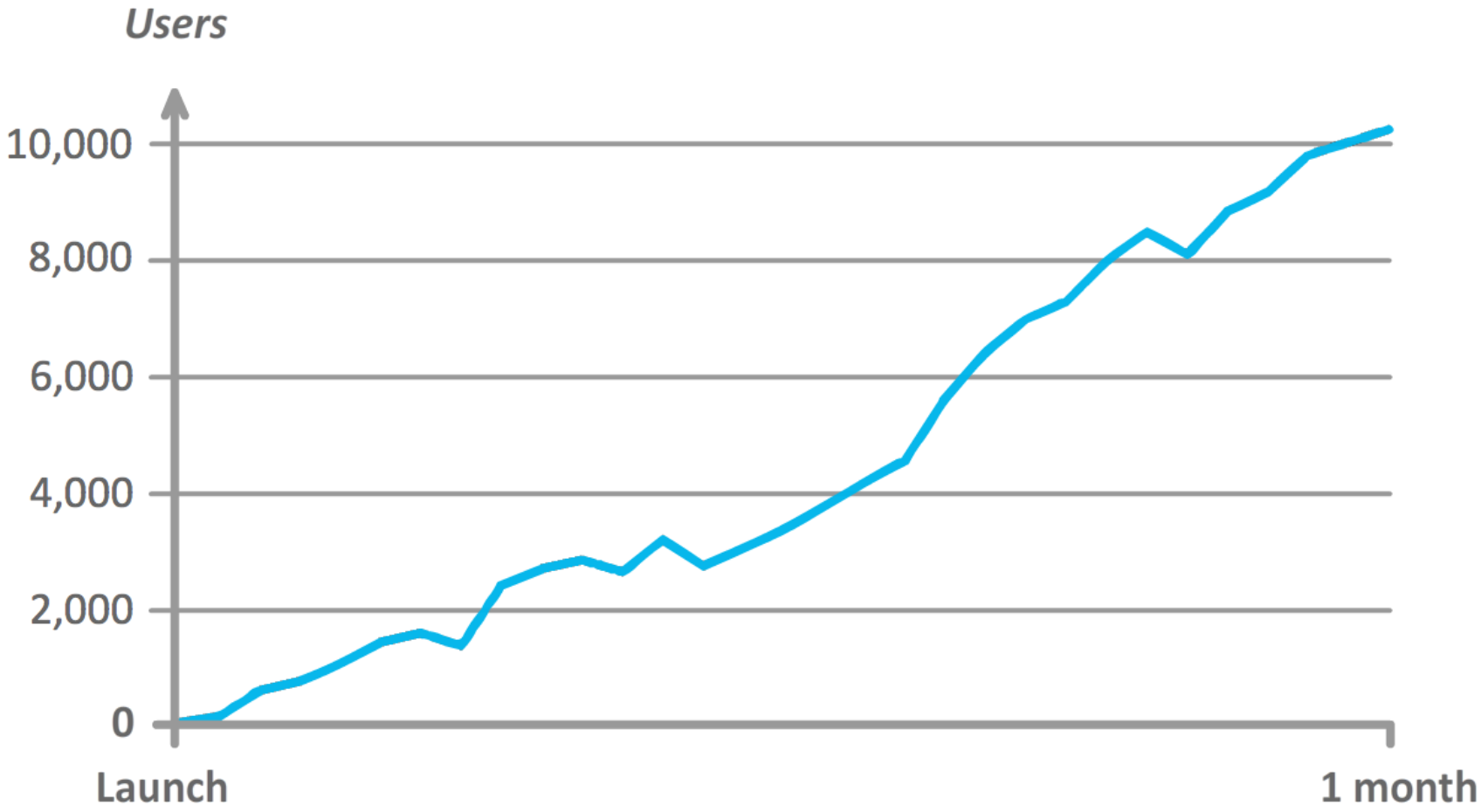
Prince of Persia: Sands

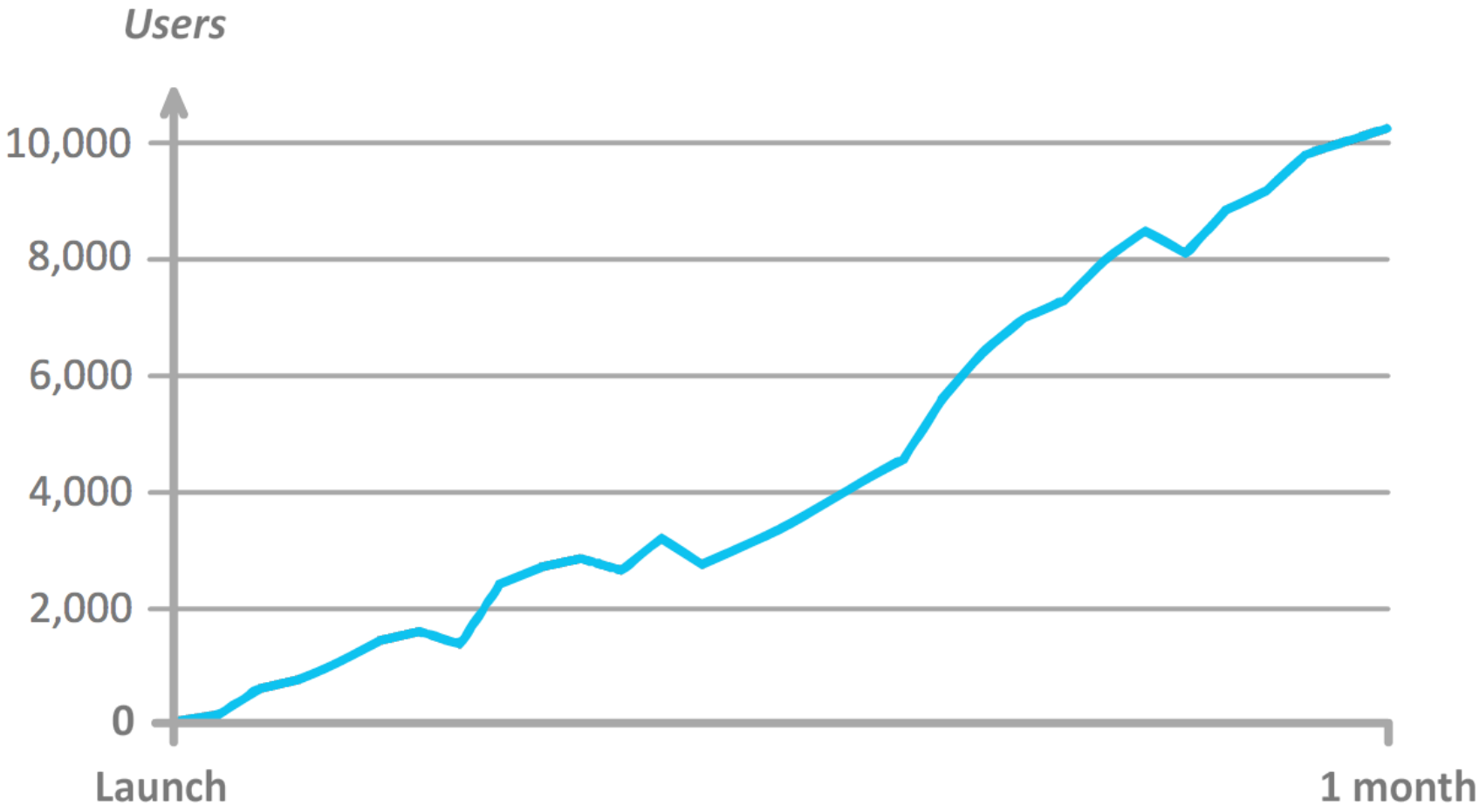
The A-Team

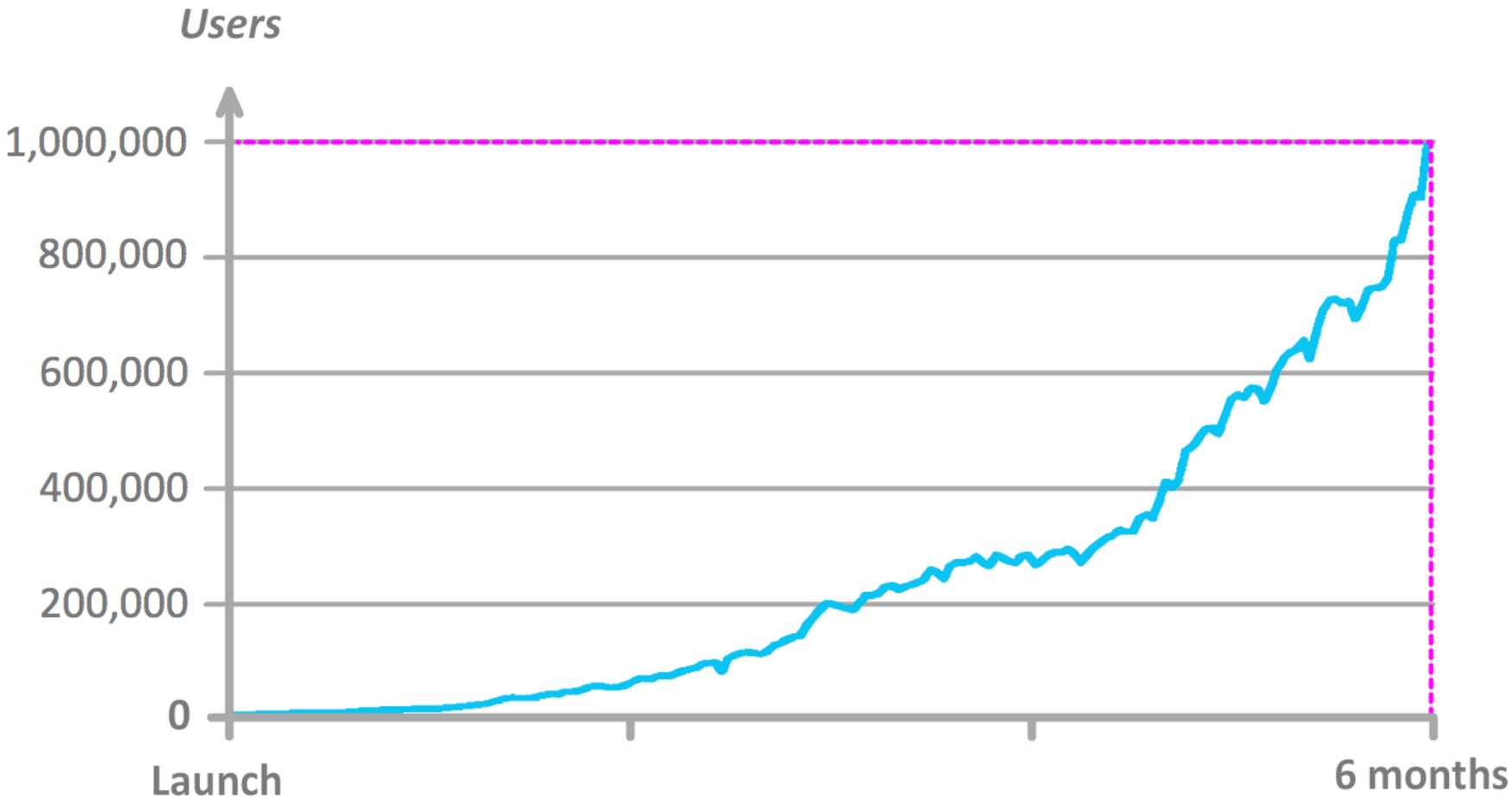
The Game is Afoot

facebook
December 2010


Users
0
Launch


Users
10,000
8,000
6,000
4,000
2,000
0
Launch
1 month


Users
10,000
8,000
6,000
4,000
2,000
0
Launch
1 month


Users
1,000,000
800,000
600,000
400,000
200,000
0
Launch
6 months

Growth – A Perfect Storm

- Low barrier to entry
- Free to play
- Global
- Social

scalability

“the ability to adapt to increased demands”

How do I build for scale?

playfish

The Three P’s of Scalability:

P1

P2

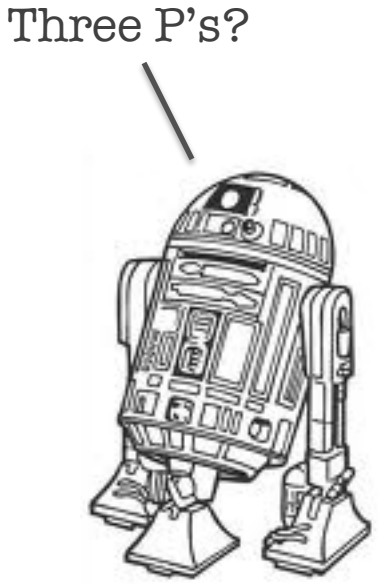
P3

The Three P’s of Scalability:

P1

P2

P3



The Three P's of Scalability:

P_1 Platform

P_2

P_3

The Three P's of Scalability:

P_1

P_2 **Product**

P_3

The Three P's of Scalability:

P_1

P_2

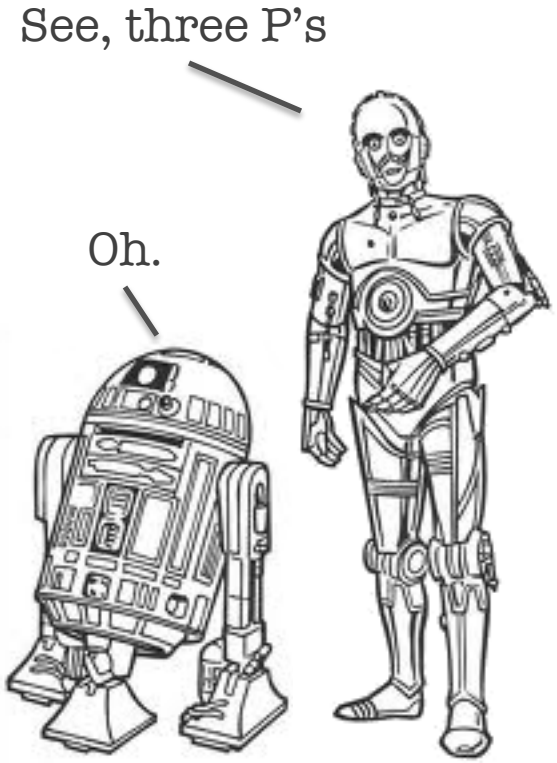
P_3 Process

The Three P's of Scalability:

P_1 Platform

P_2 Product

P_3 Process



P_1 - Platform

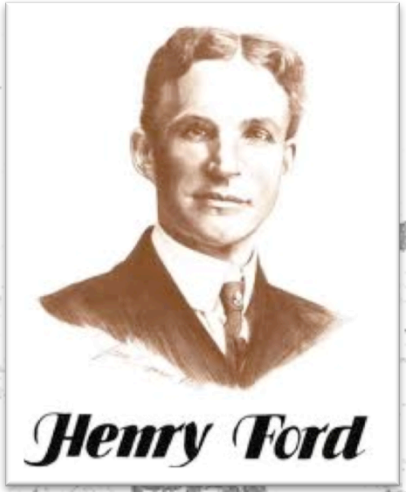
A Dilemma

Build the perfect platfom - Never leave the grid

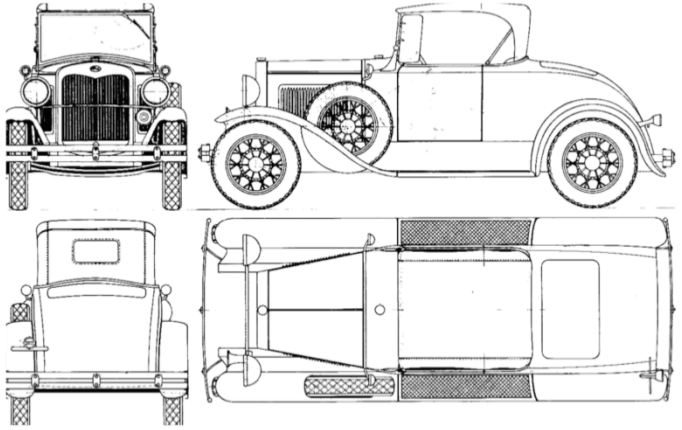
but…

Fail to scale - Crash at the first corner

playfish


Henry Ford

LIFE



P_1 - Platform

The Cloud

the cloud

“a commodified, distributed, computing service”

The Cloud

Day 1 benefits:

- Low capital outlay
- Develop product, not platform
- Low risk

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The Cloud

Long term benefits:

- Stability
- Distribution eliminates weak links
  - Hardware procurement, deployment
  - Load balancing

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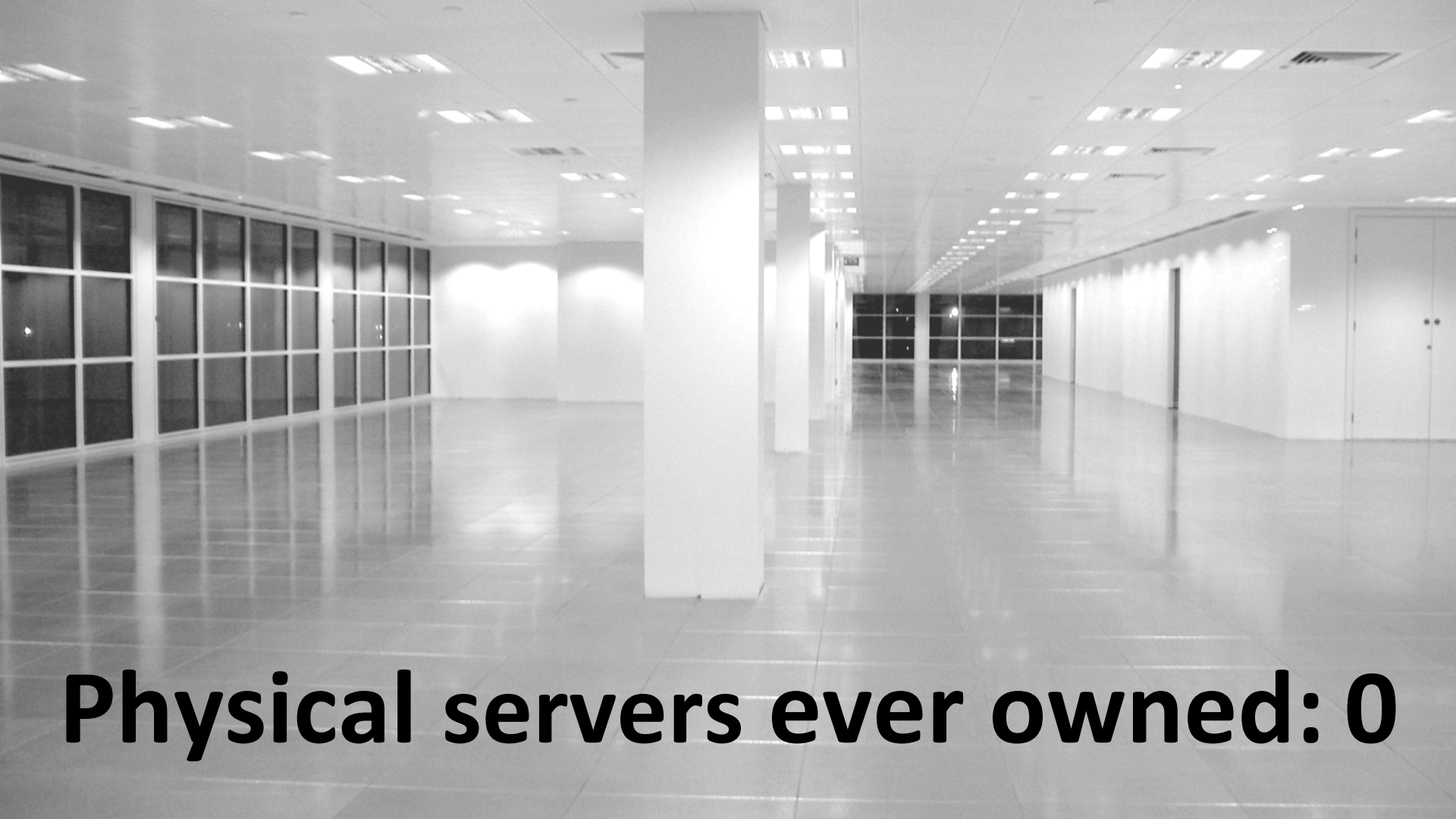
Physical servers ever owned: 0

p_1 platform

the rackspace cloud

Windows Azure

salesforce

RIGHT SCALE

EA

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Playfish in the Cloud

- Content (Cloudfront, S3)
- Computation (EC2)
- Analytics (EMR)

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The Big Numbers Slide

Players / month: 33M

Players / day: 5.5M

Players in peak hour: 0.7M

HTTP requests in peak hour: 45M (per game)

Analytics events per day: 500M

Analytics data per month: 6TB

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Playfish in the Cloud

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- Most tools free, platform agnostic
- Work from anywhere
- Make adding devs easy

The Cloud - Limitations

- Treat as infrastructure, not platform
- Proprietary
- Operational cost?
- Only as good as least scalable component

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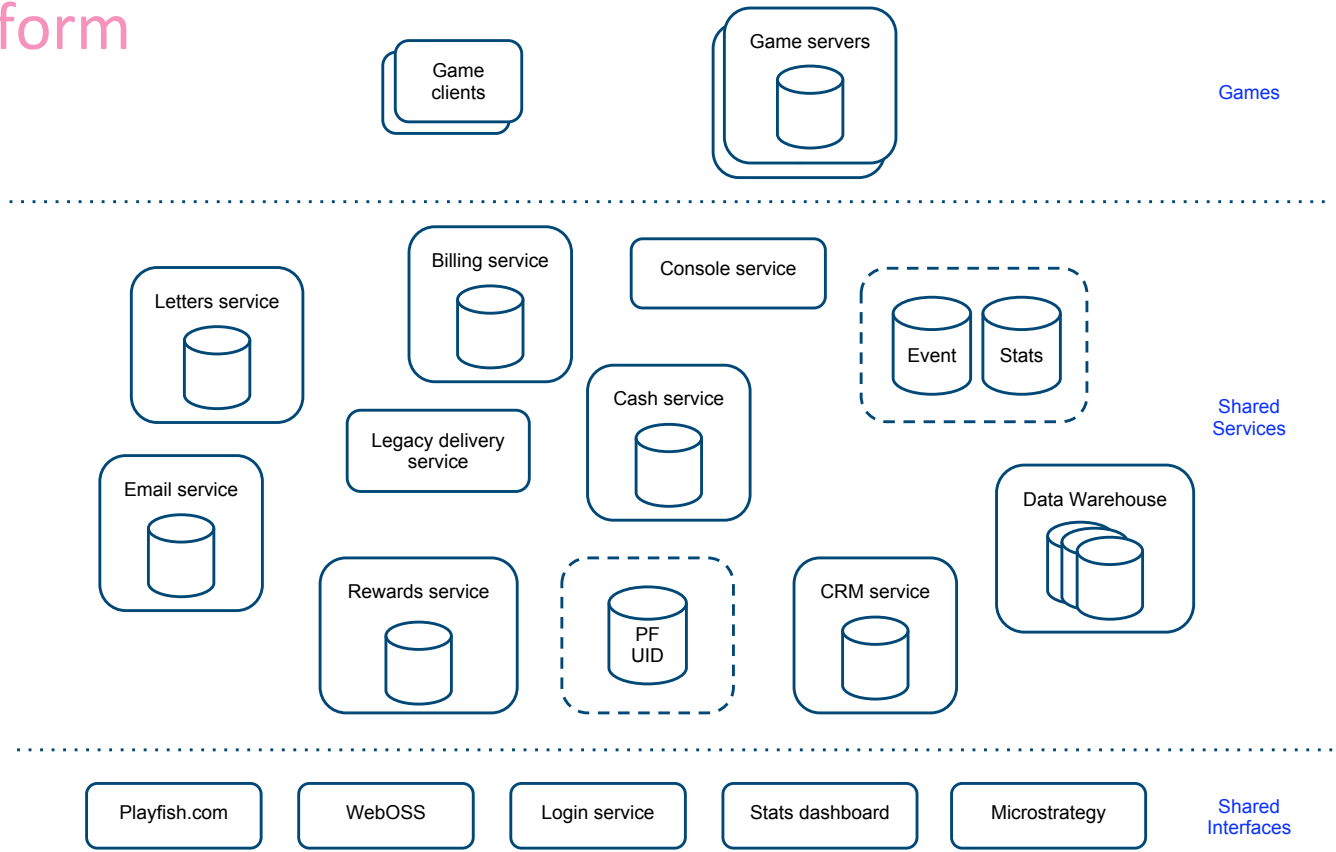
P_1 - Platform

Service Oriented Architecture

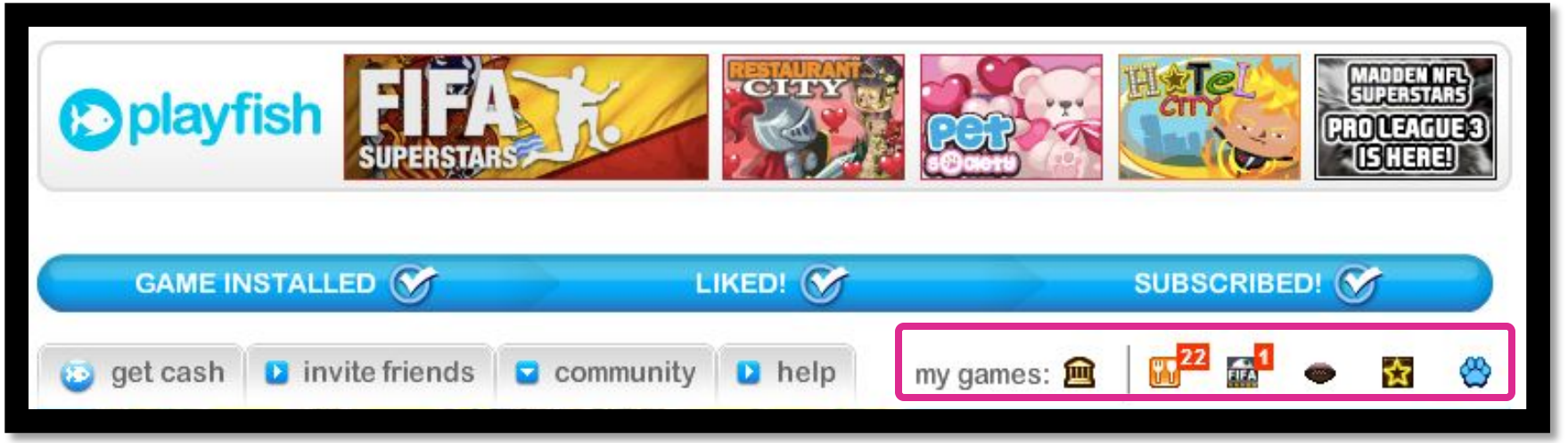
Our Original Architecture

p_1 platform



Our Architecture Today

facebook
Search
Home
playfish
FIFA SUPERSTARS
RESTAURANT CITY
pet society
HOTEL CITY
MADDEN NFL SUPERSTARS
PRO LEAGUE 3 IS HERE!
GAME INSTALLED
LIKED!
SUBSCRIBED!
get cash
invite friends
community
help
my games:
73696
2
ADD COINS
ADD PF CASH
34
249680 / 264369
LIVERMORIA
33300
GOALS
Complete Chichen Itza (0/1)
FREE
0 credi
Games
EA SPO
Golf Ch
Madder
More
Create an
Six and
How's you
Saunders,
winner &
written a
very perfe
couples.
May Fat
With Yo



SOA In Action: The Console Service

SOA In Action: The Console Service

Services

- OOP for distributed systems
- Standalone components
  - platform agnostic
  - support diverse users
  - loosen dependencies

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Services

- Game developers make tough users
  - More interested in user experience than scaling
  - Weird use cases

Services

Service Contract

- Part of API spec
- Response times, volume testing results
- “Is my usage of this service acceptable?”

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Services

Service Level Agreement

– Commitment on quality
– Not formalized but implied
– Cost of downtime is high

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P_1 - Platform

Cost-Effective Scaling

Cost-Effective Scaling

- Tech choices driven by unusual requirements and high risk of failure
  - Early adoption
  - Open Source

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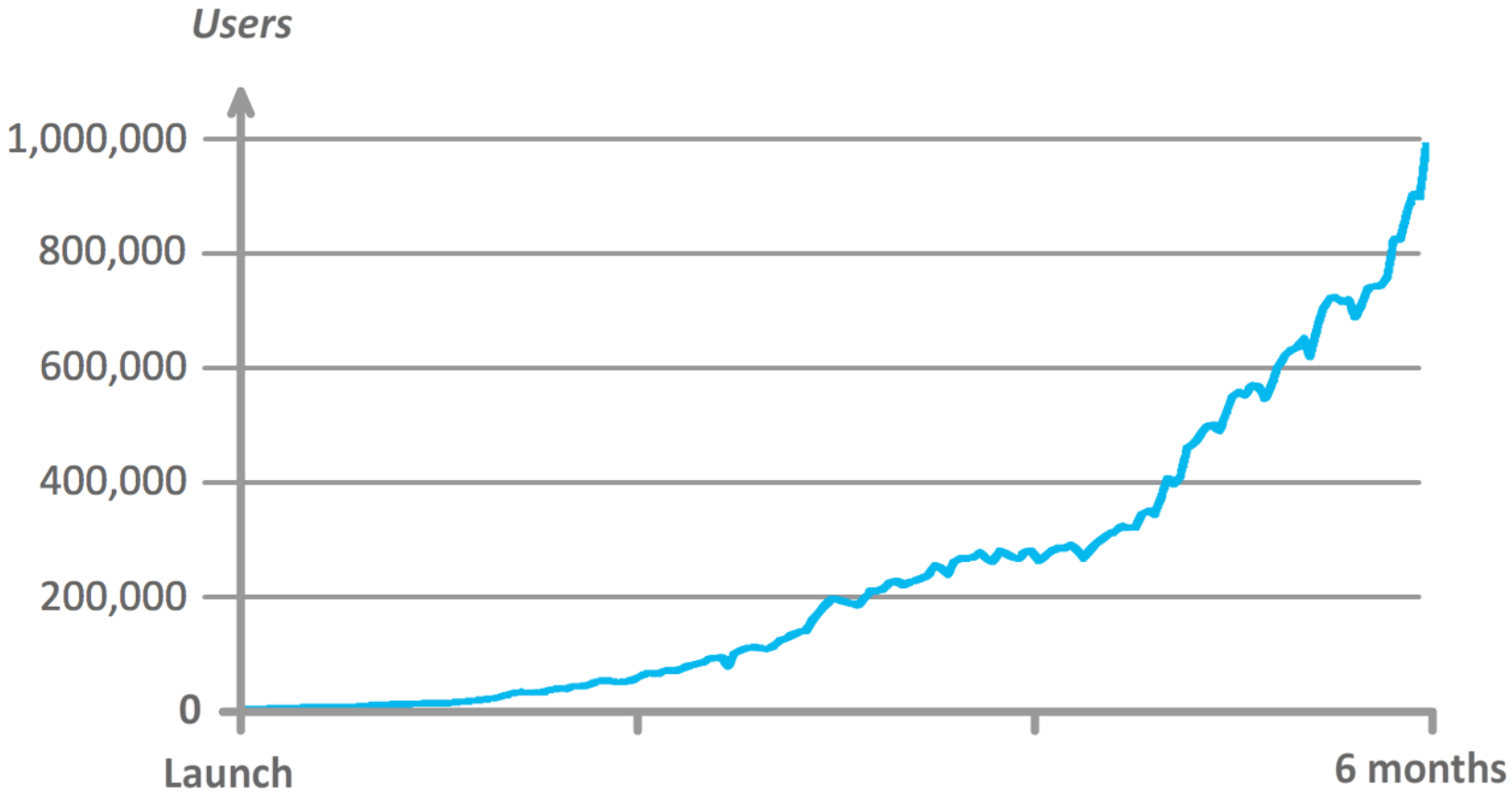
Cost-Effective Scaling

- Sharding
  - Few reads, many writes (opposite of web-site)
  - Partition data by user
  - We find random partitioning works best for social data

playfish


Users
1,000,000
800,000
600,000
400,000
200,000
0
Launch
6 months

Cost-Effective Scaling

- Sharding
- Blobs (Binary Large OBject)
  - Single record per-user
  - Fast access
  - Less table alterations (but require migratable blobs)

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P_2 - Product

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IN NUMBERS

55 million people play Playfish games every month. If all these gamers lived in one country, it would have a bigger population than England.

P_2 - Product

Scalable Game Design

Q: How do I build a scalable game?

A: Don’t build an **unscalable** game.

playfish

650
20
2
New Arrival

36,001
Add Coins
421
Add Playfish Cash
21
18
7,602
HE MESS :P
NEW !
4
3
2
1
31
Flavia
33
Jeremyn
36
Antonella
36
Maggie
+ADD FRIEND!
+ADD FRIEND!

Be Holistic

Everyone think scalable:

- Developers
- Designers
- Biz-Dev
- Product Management
- Operations

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Scalable Game Design

Network Latency:

- Can be high in Cloud environments
- MMO-level response times are expensive
- May be prohibitive for Free To Play games

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“We haven’t solved latency,
we work around it”

In general, player actions should be:

1. **Asynchronous**
2. **Deterministic**
3. **Independent**

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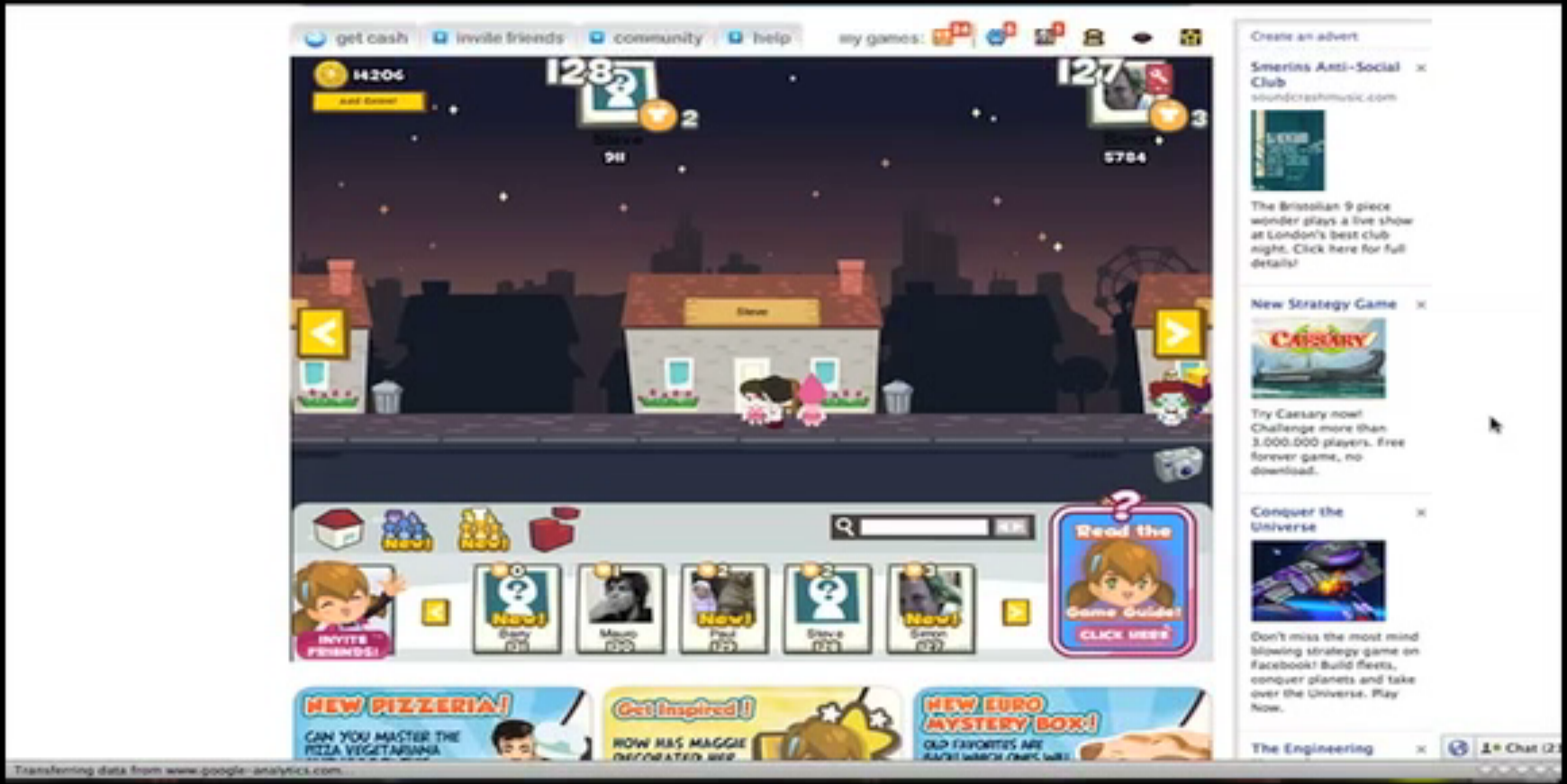
Dependent User Operation Example: Trading in Restaurant City


get cash
invite friends
community
help
my games:
14206
128
127
911
5784
Read the
Game Guide!
CLICK HERE
INVITE FRIENDS!
NEW PIZZERIA!
CAN YOU MASTER THE PIZZA VEGETARIANA
Get Inspired!
HOW HAS MAGGIE
NEW EURO MYSTERY BOX!
Create an advert
Smerins Anti-Social Club
soundcrashmusic.com
The Bristolian 9 piece wonder plays a live show at London's best club night. Click here for full details!
New Strategy Game
Try Caesary now! Challenge more than 3.000.000 players. Free forever game, no download.
Conquer the Universe
Don't miss the most mind blowing strategy game on Facebook! Build fleets, conquer planets and take over the Universe. Play Now.
The Engineering
Transferring data from www.google-analytics.com...

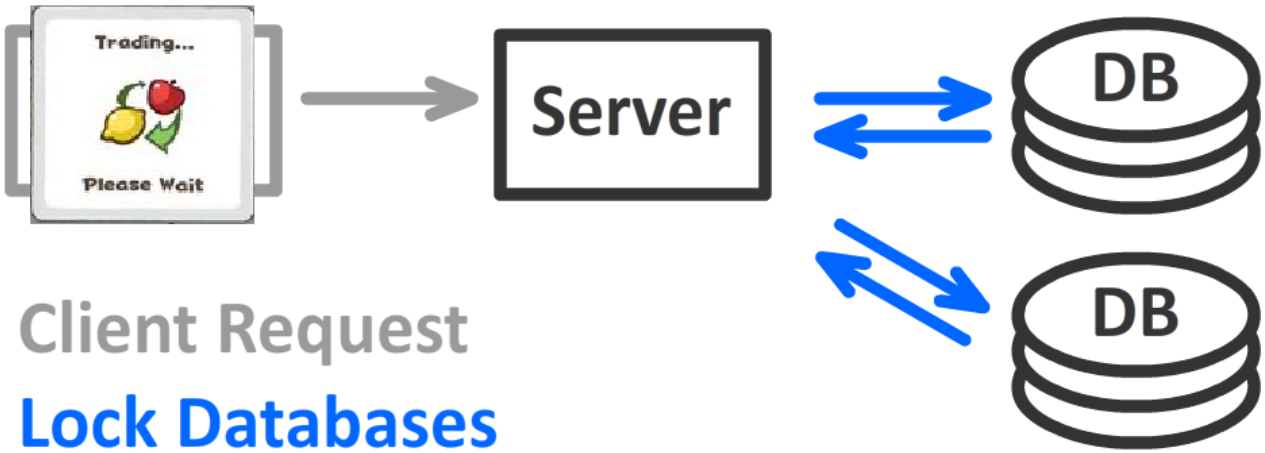
Dependent Operation (2 Users)

Client Request

Dependent Operation (2 Users)

Client Request

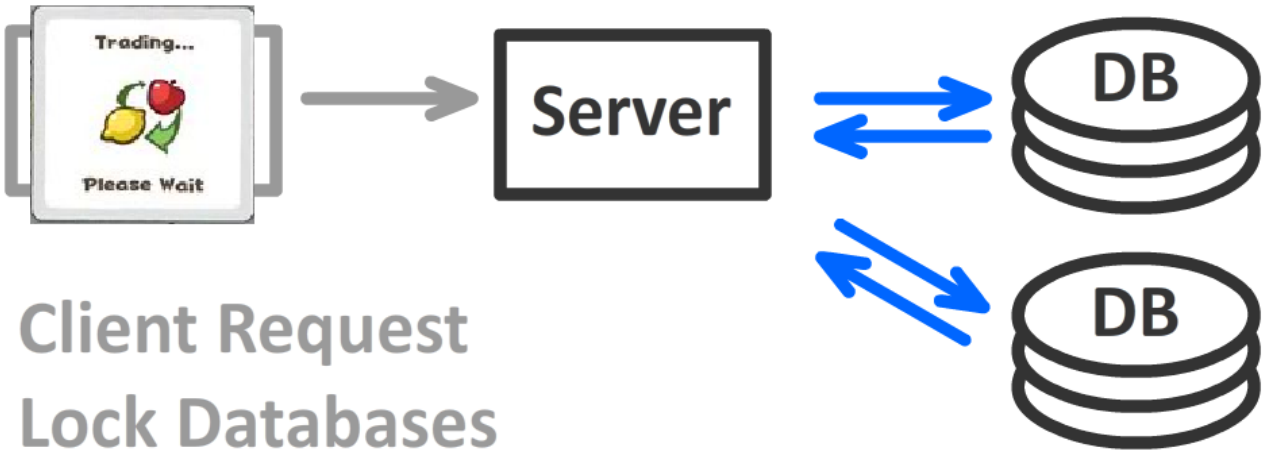
Dependent Operation (2 Users)



Client Request

Lock Databases

Dependent Operation (2 Users)

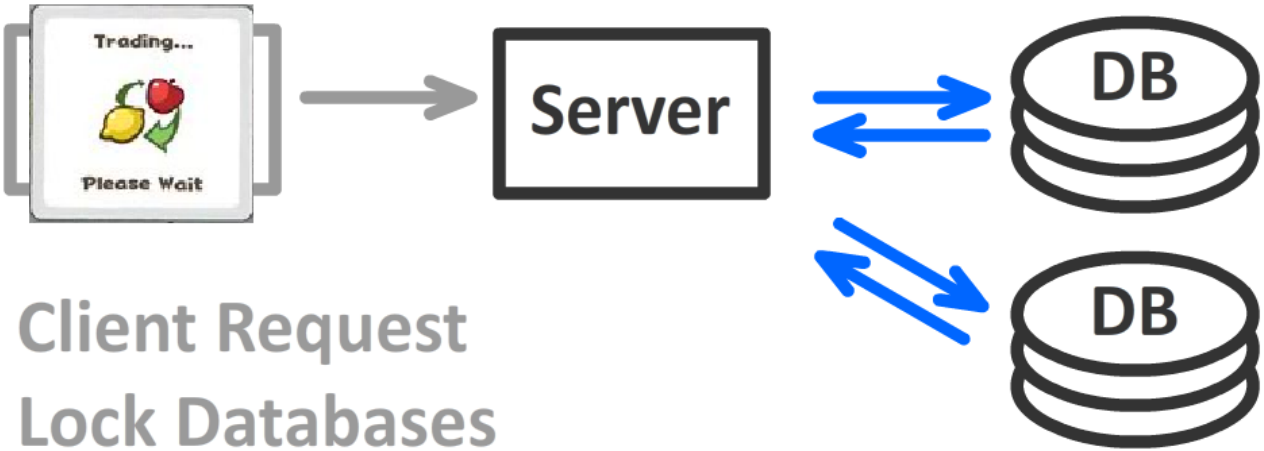


Client Request

Lock Databases

Write Databases

Dependent Operation (2 Users)



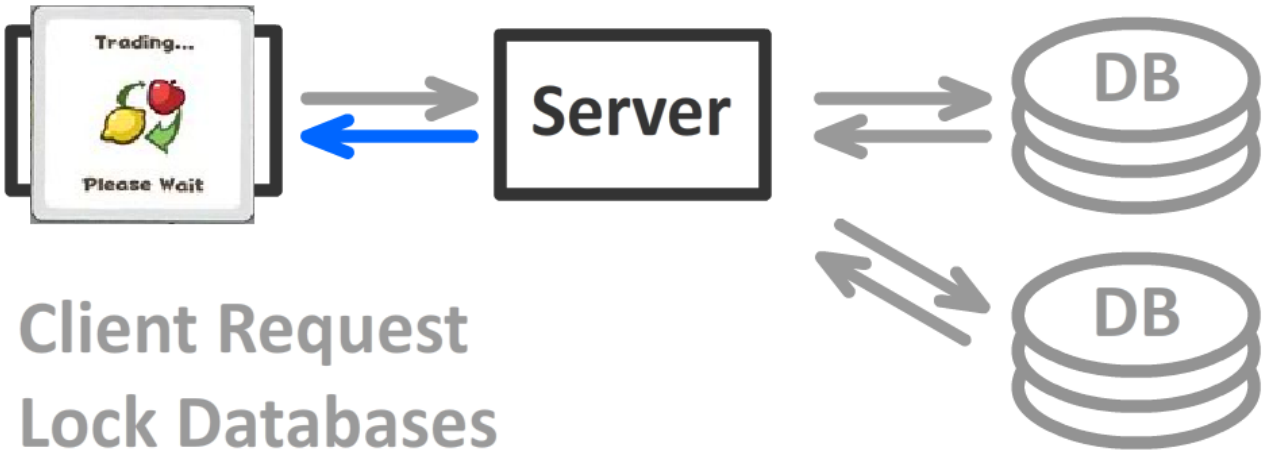
Client Request

Lock Databases

Write Databases

Unlock Databases

Dependent Operation (2 Users)



Client Request

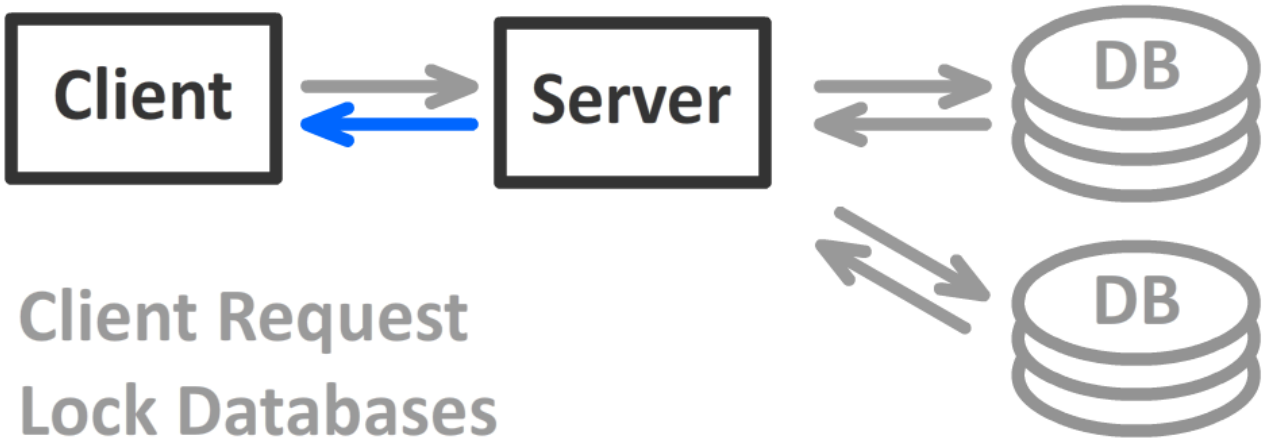
Lock Databases

Write Databases

Unlock Databases

Client Response

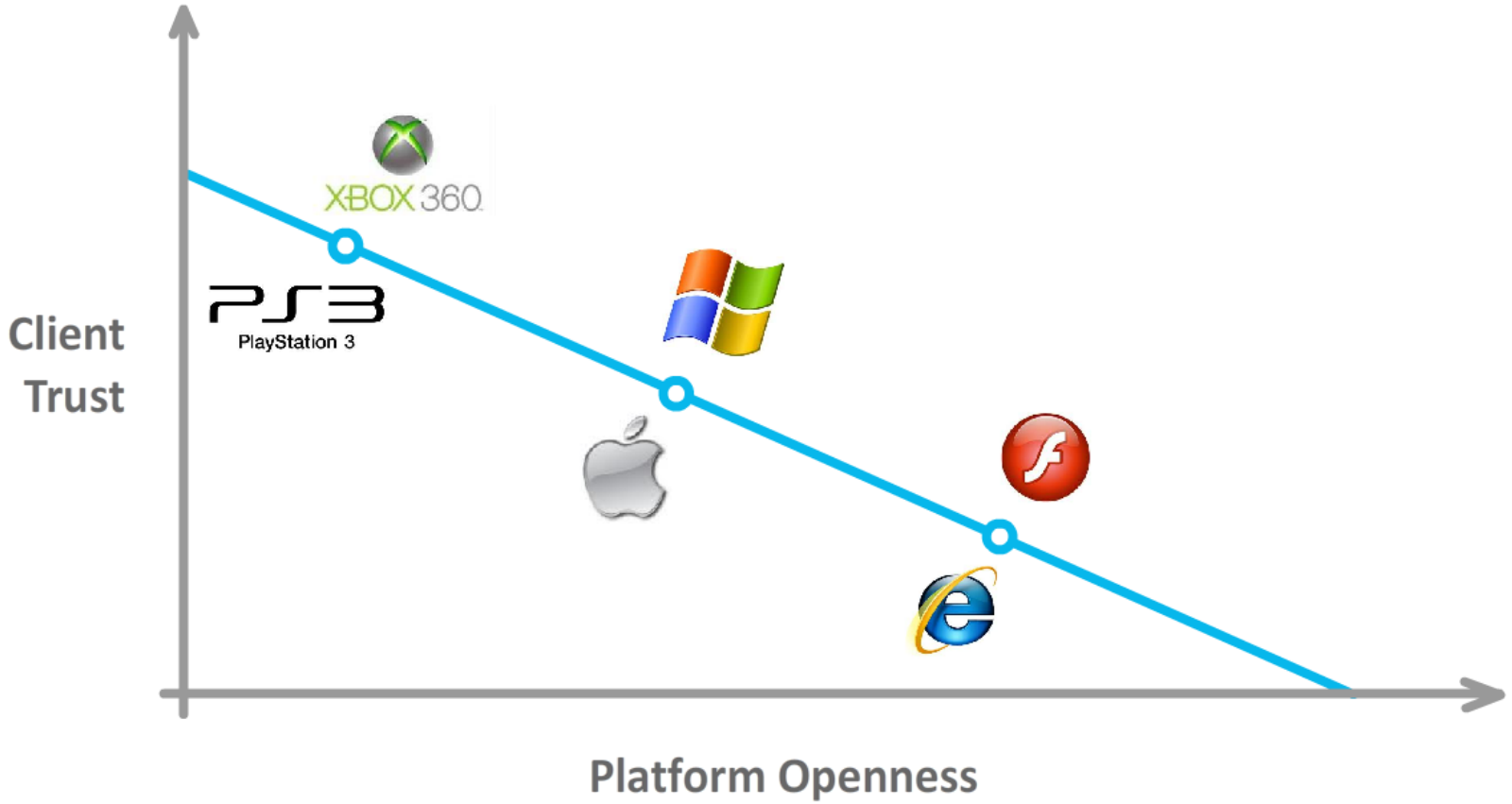
Dependent Operation (2 Users)



Client Request
Lock Databases
Write Databases
Unlock Databases
Client Response

P_2 - Product

Designing For Untrusted Clients

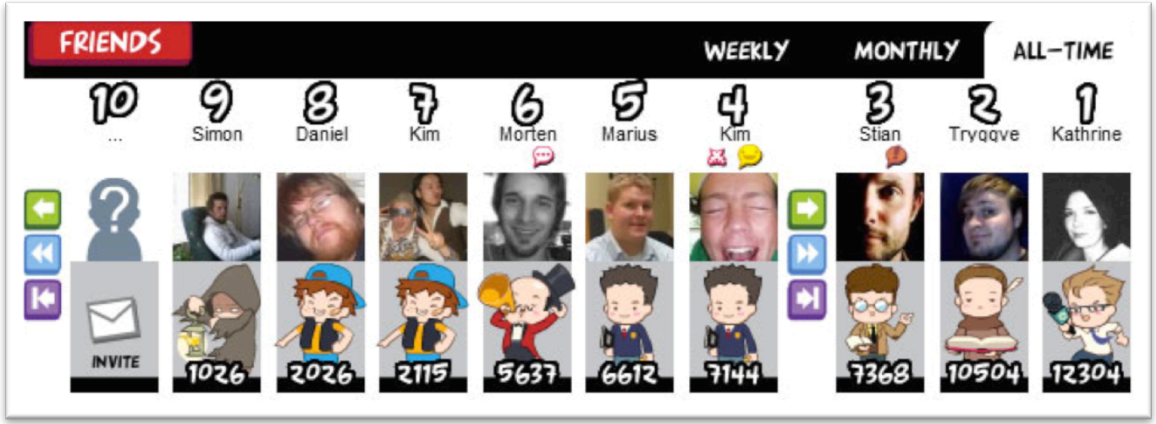

XBOX 360
PS3
PlayStation 3
Client Trust
Platform Openness

Untrusted Clients

Browser plugins highly vulnerable

- System clock
- Memory pokes
- Network manipulation
- Decompilation

playfish



Gotcha!

Avoid global leaderboards

Untrusted Clients

- Cheating destroys perceived value
  - Visible to 1 user bad
  - Visible to multiple users worse
  - Distributable cheats worst of all

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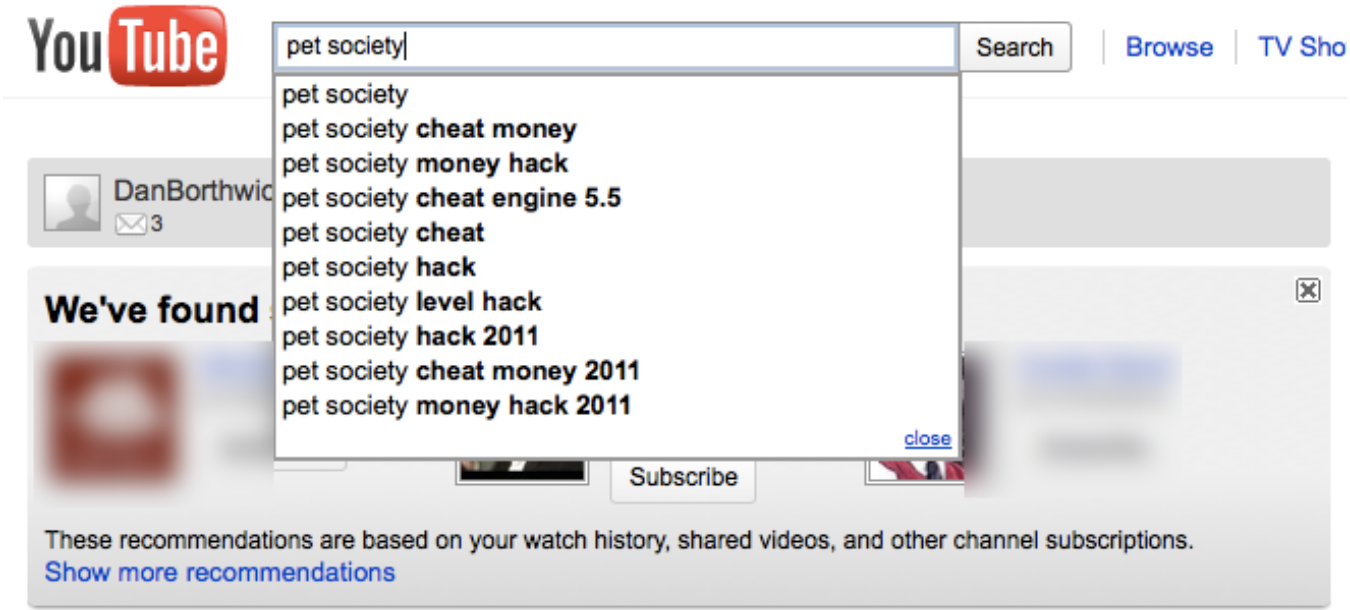
p_2 product



Distributable Cheating

Untrusted Clients

Two-level simulation:

- Server-validated, persistent core model
- Richer, temporary client-only model

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Gotcha!

Players will *always* exceed your expectations

But rules are made to be broken

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P_3 - Process

P_3 - Process

Planning For Change

Planning For Change

- Playfish deploys
  - a new game every 2-3 months
  - ~6 game updates each week
- (Down-)Time is Money

playfish

Planning For Change

- Service clients must handle downtime
- Avoid lockstep updates
- Gotcha! - Simultaneous client versions

playfish

Planning For Change

- Post-release phase new to some game devs
- Long-term maintainable codebase
- Technical debt process

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P_3 - Process

Operations

Operations - Testing

- Stability vs Maintainability
- Test throughout dev cycle (don't crunch)
- Continuous Integration
- Automated scales better than manual

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Operations - Servers

6 people running >1,000 virtual servers

playfish

Operations - Servers

- Configuration management
  - Hundreds of servers
  - Script everything (we use Puppet)
  - Bonus: Easy live-like dev environment

playfish

Operations - Analytics

- Split testing
  - Always have a control group
  - Pre-define success goals
  - Gotcha: Noise from other tests!

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Operations - Analytics

- Split testing
- Scalable analytics is hard!
  - 1.5 billion events/day
  - 6Tb data/month
  - We use Amazon Elastic MapReduce / Hadoop

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Takeaways

Takeaway 1

Social games belong in The Cloud

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Takeaway 2

Choose a scalable product

playfish

Takeaway 3

Everybody think scalable!

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P_1 Platform

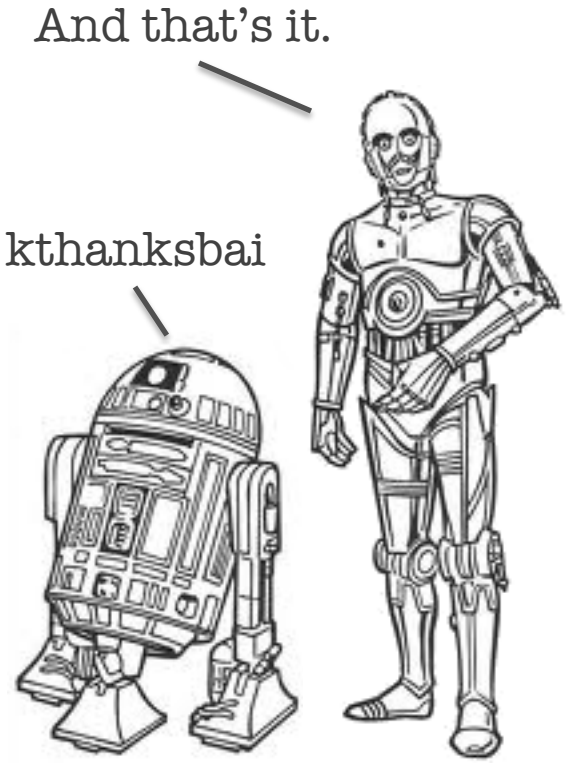
P_2 Product

P_3 Process

P_1 Platform

P_2 Product

P_3 Process



Questions?

dan.borthwick@playfish.com