Games-R-US

ISMT E-599: Capstone Seminar in Digital Enterprise

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Company Overview

- Games-R-Us is a MMOGs (Massively Multiplayer Online Game) platform
- Revenue model:
  - Monthly subscription to play all game offerings
  - In-Game Purchases
- Current Popular Game Offerings: Wombat Castles, Moon Craft, and Zombie Killers
- Audience: Individuals aged 13+
- Competitors: Utomik, Jump, EA Access, GameFly, Xbox One Pass, Playstation Now, OnePlay
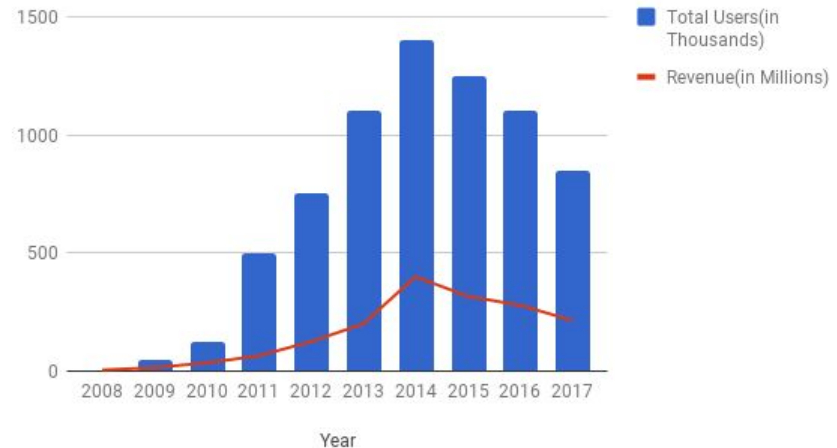
Business Problem and Objective

Business Problem

Declining revenue and market share due to:

- Low free-trial to paid-subscriber conversion

- Declining subscriber renewal

- Higher marketing cost per subscriber due to manual sales conversion process

- Existing data platform does not provide enough metrics for comprehensive analysis

Business Objective

- Increase conversion rate from free-trial to paid subscribers

- Retain existing subscribers

- Implement machine learning analysis on user behavior to support the customized marketing campaigns
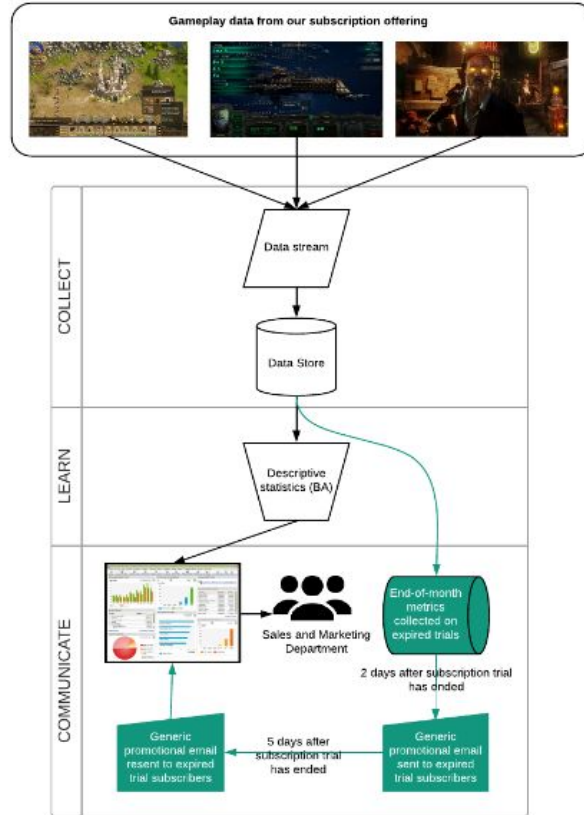
As Is Workflow

As-Is Workflow for Marketing to Trial Users

User Signs Up for Access to GamesRUs

Information of Expired Trial User Sent to Marketing

First Generic Promotional Email Sent to User (32 Days)

Final Generic Promotional Email Sent to User (35 Days)

Free Trial Period
Jan 1 - Jan 30

Marketing Period for Expired Users
Jan 30 - Feb 5

Note: Sample timeline for user that signs up on January 1st.

As Is Platform Architecture

Functional Requirements

- Instrument gaming app to collect additional event data
- Collect & ingest the following in the data lake via the Informatica Cloud platform:
  - Financial Data
  - Gaming Data
  - Customer Data
- Determine best machine learning algorithm for churn prediction
- Machine learning predictions available every 24 hours as download from Yokozuna Data ML results
- Machine learning predictions to provide best in-game subscriptions or items to entice disengaged subscribers to play
- Provide dashboards for the CMO & marketing managers that enable them to:
  - View campaign metrics & stats on various marketing campaigns
  - Preview / edit / approve marketing campaigns
- Dashboards for company executives, marketing managers, product managers that provide daily, weekly & hourly reports of: sales, potential churners, playtime by game, new, active & total players by game & marketing & advertising budgets

Non-Functional Requirements

The new platform should incorporate the following non-functional requirements:

- Comply with data security and subscriber privacy laws and regulations
- Be scalable as user base increases
- Maintain a 99% uptime for gaming platform
- 80% Machine Learning model accuracy

Business Benefit Justification

EOY	2015	2016	2017		2018	2019	2020
Active Customers	1,250,000	1,100,000	850,000		1,000,000	1,250,00	1,650,000
Avg Customer Spending per year	$200	$160	$140		$175	$200	$225
Conversion Rate (Trial to Paid Subscriber)	25%	23%	15%		20%	25%	30%
Churn Rate	6.32%	7.45%	8.12%		7.5%	6.25%	4%
Revenue ($ million)	$317.5	$279.4	$215.9		$250	$300	$375
Operating Costs (million)	$12.6	$13.1	$13.7		$15.1	$14	$14.5

Projected Development and Operational Costs

Initial Investment Estimated at $100,000/man-month	Additional Yearly Operational Costs	Estimated Increase in Revenue
1. Integration with Oracle (Finance Data) and Salesforce (Customer Data) using Informatica: $200,000 2. Integrate Game A to C with Informatica and Google Firebase Cloud Messaging: $300,000 Machine Learning Platform - $600,000 3. Deploy Yokozuna Machine Learning SaaS - $300,000 Estimated Total Project Cost: $1.4 million	Infrastructure - $600,000 / year Maintenance - $400,000 / year Estimated Yearly Cost: $1 million	EOY 2018 $35 million EOY 2019 $50 million EOY 2020 $75 million

Technical Specification

Architectural Overview
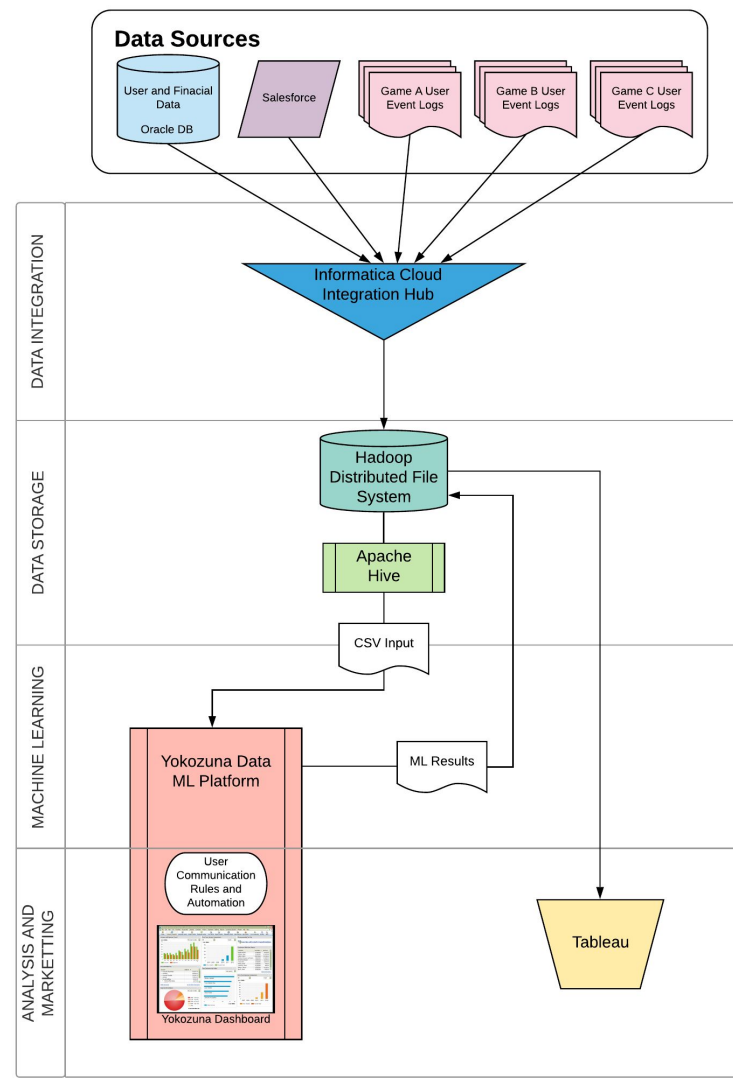
Software Solution

SaaS Machine Learning

Amazon SageMaker

Azure ML

YOKOZUNA
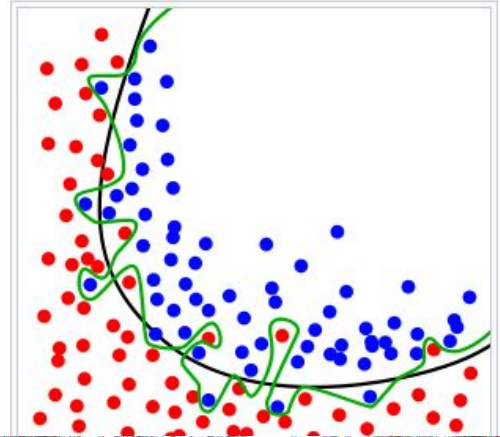
On-Premise Machine Learning

R

Tradition Solution to Overfitting:
- Pruning

Yokozuna Data's Solution:
- Survival Ensembles

Software Solution

Comparison of different Algorithms

Model	AUC
Survival Ensemble	0.960
Support Vector Machines	0.940
Decision Tree	0.934
Naive Bayesian	0.900

Software Solution
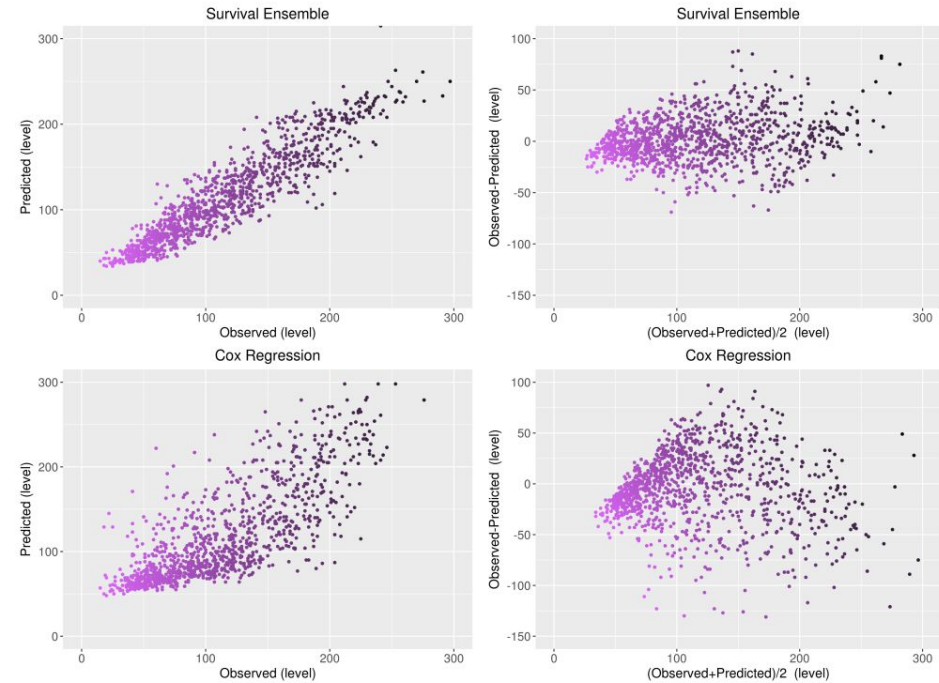
Fig. 2. Predicted median survival level vs. observed level (left) and relative deviation (right) for churned players, using the survival ensemble and Cox regression models
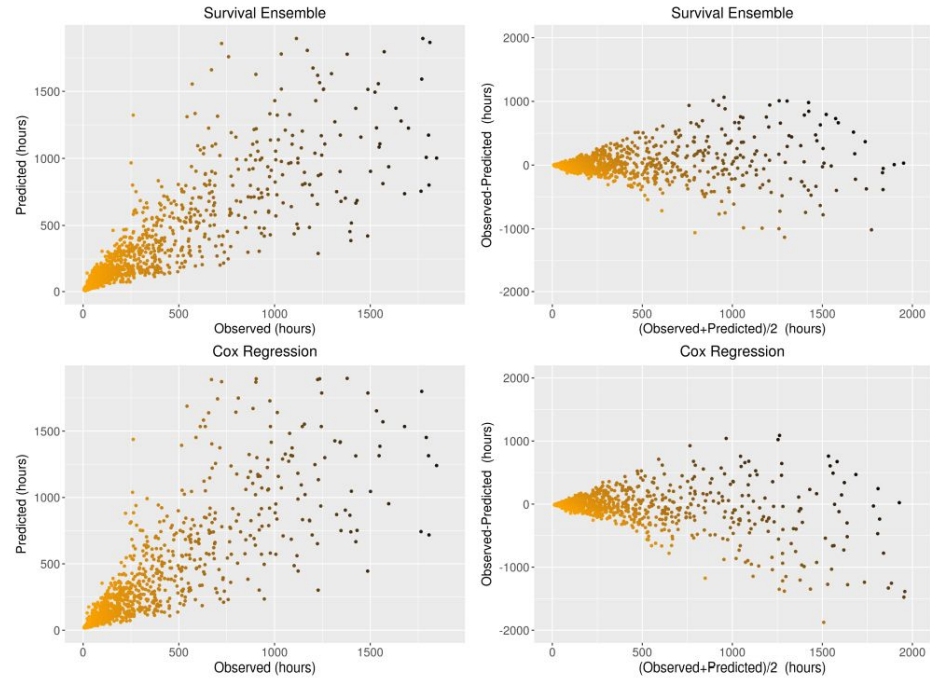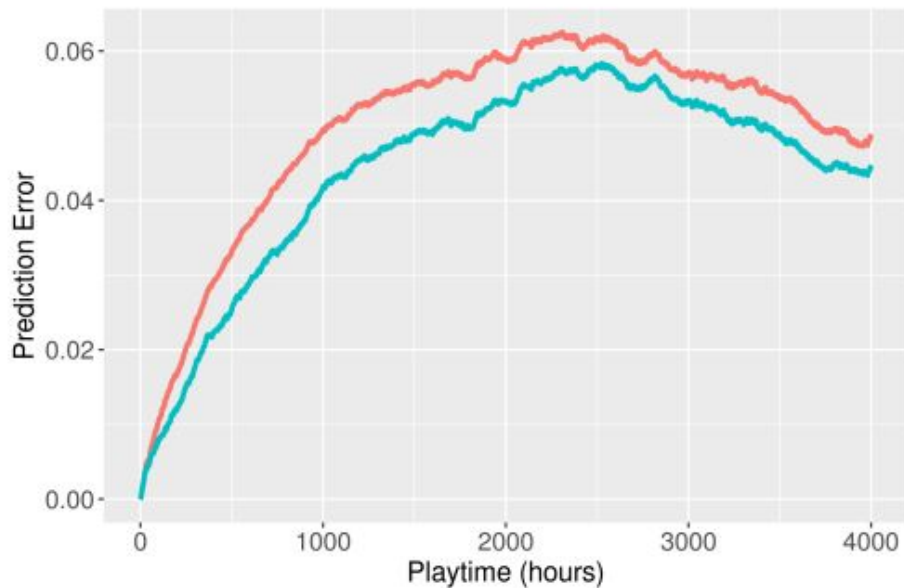
Fig. 3. Predicted median survival playtime vs. observed playtime (left) and relative deviation (right) for churned players, using the survival ensemble and Cox regression models.
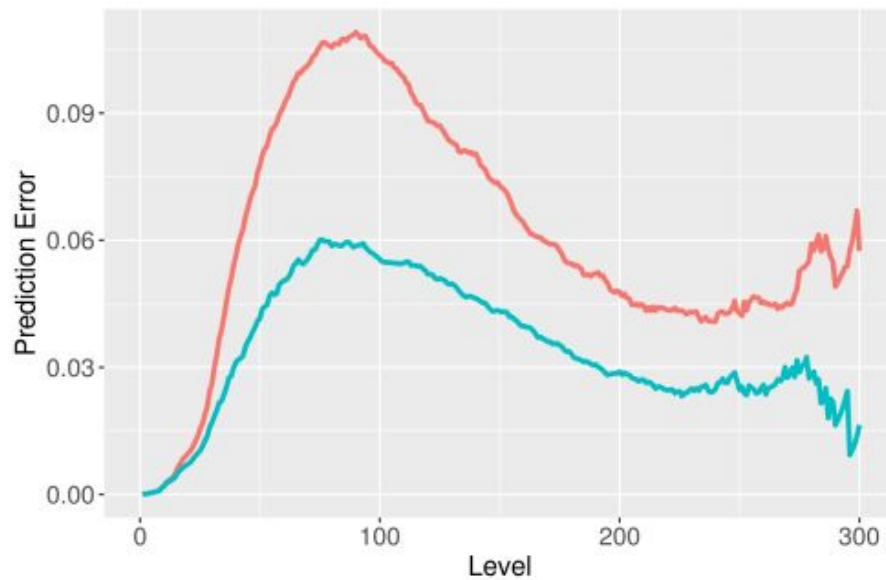
Software Solution

Prediction Error Comparison

Software Solution

Why Games-R-US Selected Yokozuna Data:

- Out-of-the-Box Machine Learning algorithm
- Easy data upload
- 80% Machine Learning model accuracy
- Provides marketing dashboard
- Cloud based

Why Games-R-US selected Yokozuna:

- Machine Learning Model developed in 2014
- Yokozuna has acquired additional customers since 2014
- ML model improved since 2016 with increase in data
- The amount of data available to Yokozuna far exceeds our datasets

Why Games-R-US selected Yokozuna:

- Identify In-Game Types of Purchasers
  - Stopped Spending
  - Potential Purchase Churners
  - Alive
- Initiate Marketing Campaigns:
  - Send in-game items
  - Offer in-game purchase discounts

Two New Platforms Integrated into Existing System
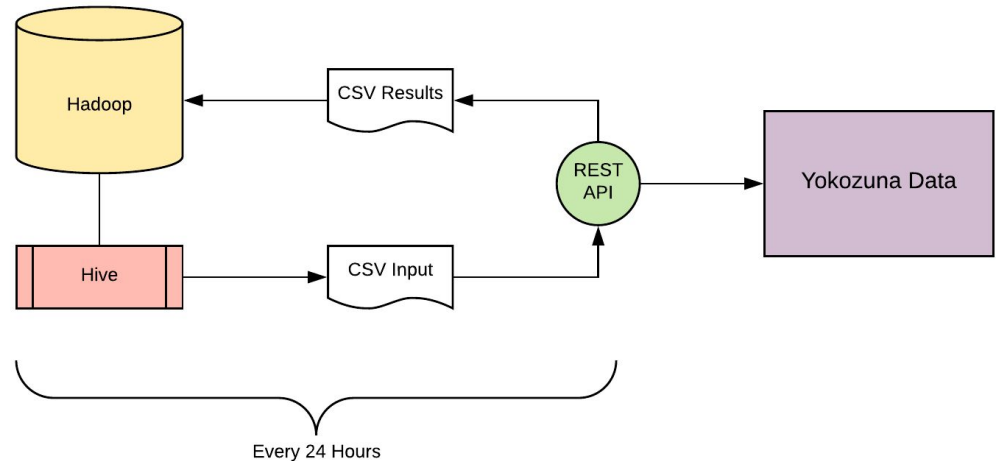
1. Yokozuna Data
2. Informatica Integration Hub

Yokozuna Data Integration

We will use Yokozuna's REST API to send input data and retrieve results.

```
curl
https://yokozuna.siliconstudio.co.jp/Ga
meAnalytics/api/VipClass \
  -H "Authorization: Key abcdef0123" \
  -d '{"product": "1", "startDate":
"2017-04-01"}'
```

A scheduled job will run a script to extract the required data using Hive queries.

```
hive -e 'select * from your_Table' | sed
's/[\t]/,/g' > /home/yourfile.csv
```

Yokozuna Data Integration

usersLoggedIn-yyyy-MM-dd.csv:

Field	Type	Description
userId	text	Unique user ID per game title
name	text	User Name
level	int	User's level (or rank, progression, account level)
clanID	text	Clan/guild/organization the user belongs to
registerDate	datetime	Registration date in format yyyy-MM-dd HH:mm:ss
lastLogin	datetime	Login date in the format yyyy-MM-dd HH:mm:ss
platform	text	Platform user is using, e.g. "Google", "Apple"
advertisingID	text	User's device advertising ID, IDFA (iOS)/AAID (Android)
regToken	text	Token for push notifications (Firebase, OneSignal..)
email	text	User's email address

purchases-yyyy-MM-dd.csv:

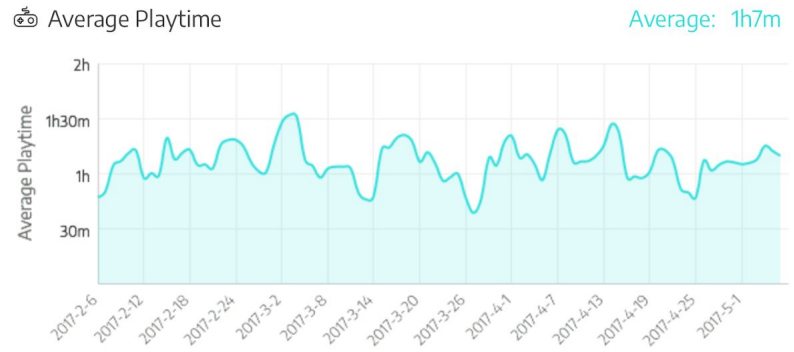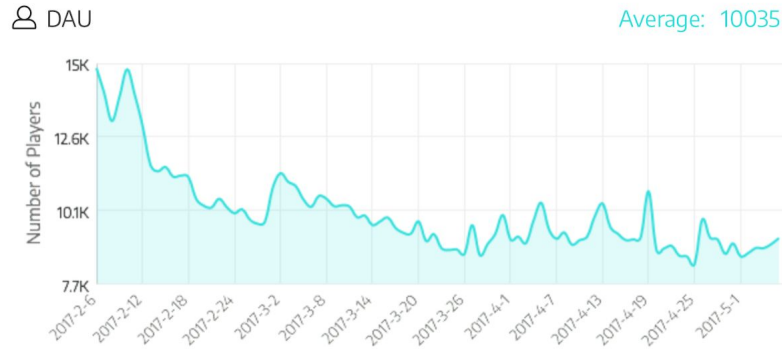| Field	Type	Description
userId	text	Unique user ID per game title
characterID	text	Unique character ID in case there are multiple characters
date	datetime	Purchase date format yyyy-MM-dd HH:mm:ss
itemID	text	IAP (In-App Purchase) item name, type of purchase made, or gacha ID, including converting to in-game money.
price	double	Price of the item
platform	text	Platform user is using, e.g., "Google", "Apple"

Data Security Requirements

To comply with data security requirements in other countries, the strictest regulations will be adopted (GDPR)

- ○ Only the hashed value of the user ID and email address will be uploaded to Yokozuna
- ○ Only purchase history will be shared with Yokozuna without user payment and contact information

Daily Active Users and Avg Playtime
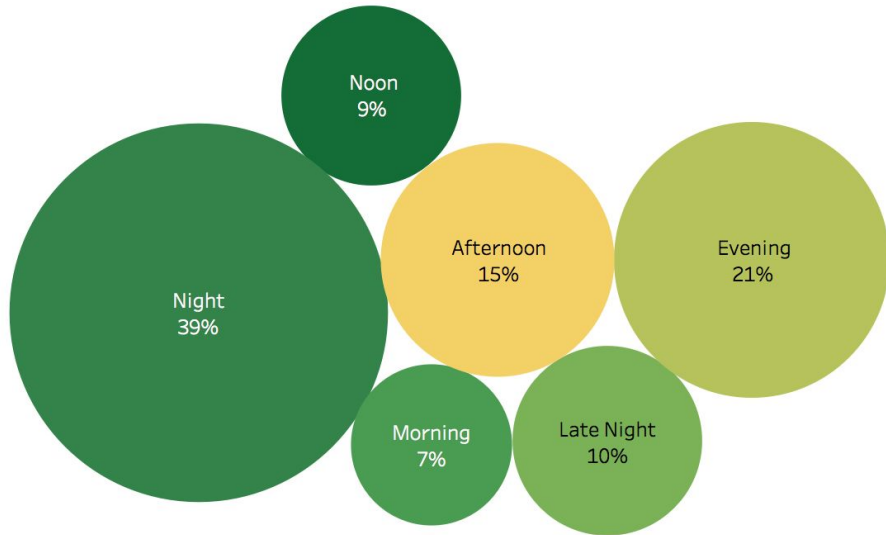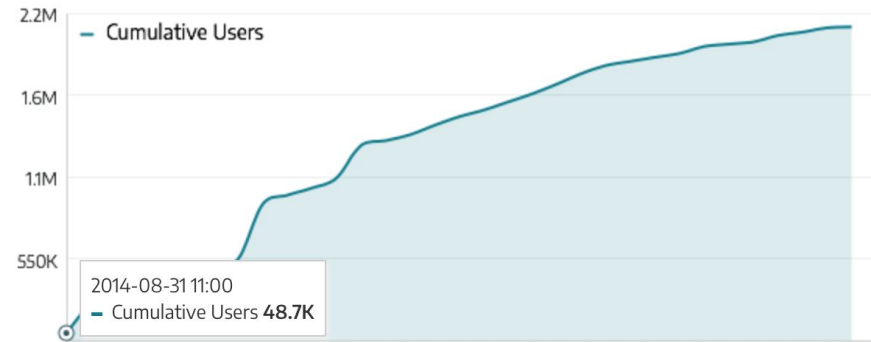
Solution Demonstration

User Information

Noon
9%

Afternoon
15%

Evening
21%

Night
39%

Morning
7%

Late Night
10%

📊 Total Users

Cumulative Users

2.2M

1.6M

1.1M

550K

2014-08-31 11:00
Cumulative Users **48.7K**
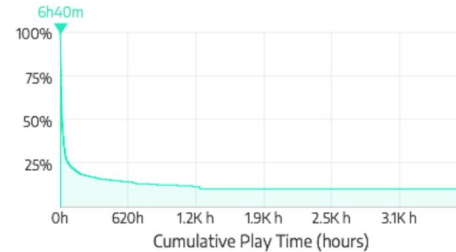
Churn Analysis
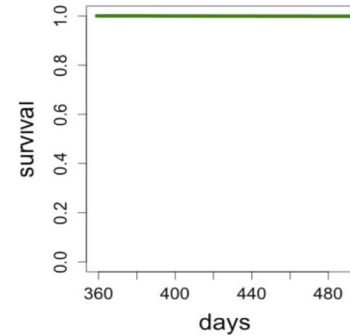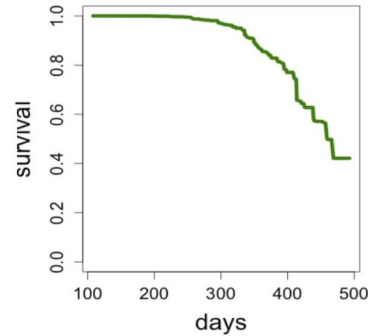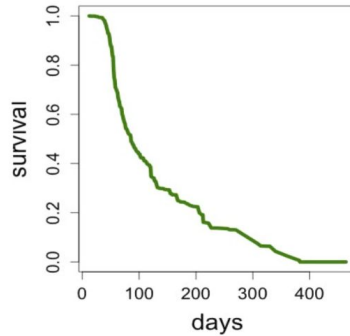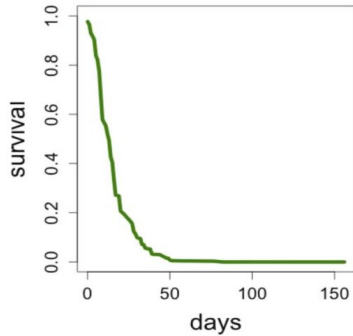
RISK OF LEAVING THE GAME

☑ High Risk

13.86%
333

☑ Mid Risk

14.07%
338

☑ Low Risk

19.02%
457

☑ No Risk

53.06%
1275
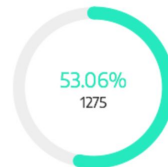
Solution Demonstration

Promotion Management Screen

Execute New Action ×

Target	May Churn (Churn Prediction) (60)
Date	2018-03-20
Options	At each player optimal time slot ☑
	Time Since Last Message 7 Days
Action	Send Item Normal
Custom Parameters	{"items":[{"count":2,"id":"itemA"},{"count":3,"id":"itemB"}]}
Validate Server Key	

Execute **Cancel**

Campaign Management

User Id	Click to Send	
1111123242		No promotion
1111123243		No promotion
1111123244	Click to Send	20% Email Discount
1111123245	Click to Send	35% Email Discount
1111123246		No promotion
1111123247	Click to Send	In app Free Character
1111123248	Click to Send	In app Free Character
1111123249	Click to Send	In app Free Character
1111123250		No promotion
1111123251		No promotion
1111123252	Click to Send	50% Email Discount
1111123253		No promotion
1111123254	Click to Send	2 months free

Solution Development

✖

Implementation Plan

Solution Development

General

- Agile Methodology
- Daily Scrums
- Vendors: Yokozuna, Informatica
- Nine epics total
- Each epic is a three week sprints except for four epics which will take two sprints
- Scrum teams include members from the Development Team, Information Systems, Marketing, Data Scientists, Business, and Database Administrators
- ISMT will incorporate system and user acceptance testing where applicable with each epic.

Development Plan

| Epics	Teams	Deliverables	Testing
Epic #1	DBA, ISMT, Data Scientists, Yokozuna	Provide training to Data Scientists and Developers so data model can be built for Oracle and Salesforce. Test connectivity and data model from Informatica to Hadoop using Apache Hive.	System
Epic #2	DBA, ISMT, Data Scientists, Yokozuna	Capture Salesforce data to Hadoop for Yokozuna ML analysis using Informatica.	System
Epic #3	Team 1: DBA, ISMT, Data Scientists Team 2: ISMT, Yokozuna	Capture Oracle DB to Hadoop for Yokozuna ML analysis using Informatica.	System
Epic #4	Team 1: DEV team 1, DBA, Data Scientists Team 2: DEV team 2, Yokozuna, ISMT	Integrate data injection pipeline from Game A using Informatica	System

Development Plan

Epic #5	DBA, DEV, Yokozuna, Data Scientists, Marketing	Create automated upload process from Apache Hive to Yokozuna Data; Yokozuna to run quality control algorithm to ensure data compatibility with their Machine Learning Model	System and UAT
Epic #6	DEV, ISMT	Integrate Game A with Google Firebase Cloud Messaging. Yokozuna platform is live with Game A.	UAT
Epic #7	DBA, DEV, Yokozuna, Marketing, ISMT, Data Scientists	Create automated download process from Yokozuna Data to Apache Hadoop through Hive	UAT
Epic #8	DEV team, Yokozuna, DBA,	Integrate Game B with Informatica,	System and UAT
	Data Scientists	Yokozuna, and Google Firebase Cloud Messaging. Yokozuna platform is live with Game B.	

Development Plan

Epic #9	DEV team, Yokozuna, DBA, Data Scientists	Integrate Game C with Informatica, Yokozuna, and Google Firebase Cloud Messaging. Yokozuna platform is live with Game C.	System and UAT

Development Plan
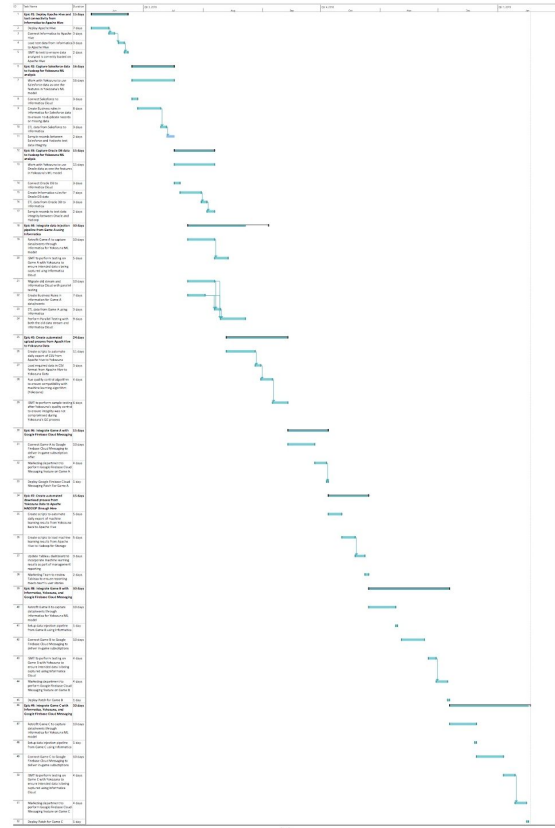
- Start date: June 2018

- End date: Q1 2019

- Total of 43 tasks in 9 epics

- Three week sprint with the except for the following epics (Two sprints):

  - Epic #4 - Integrate data injection pipeline from Game A using Informatica

  - Epic #5 - Create automated upload process from Apache Hive to Yokozuna Data; Yokozuna to run QC algorithm to ensure data compatibility

  - Epic #8 and #9 - Integrate Game B and C to our infrastructure

Operational Readiness

Service Level Agreement
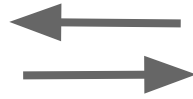
99.5%
Dashboard Availability

99.995%
ML Service Uptime

Initial Processing Time	Users Analyzed
< 16 hours	10,000,000
Daily Processing Time	**Users Analyzed**
< 1 hour	10,000,000

Operational Level Agreement

User Enablement

| Input Data into Yokozuna | Monitor Yokozuna Prediction Results | Monitor Informatica Cloud Integration | Automate System with Manual Monitoring & Adjustment | Training & Continous Improvement |

Implementation Overview

- Data scientists & developers use past & current user profile & gaming data with Yokozuna
- Marketing team & data scientists will monitor Yokozuna's Machine Learning models' results & predictions & manually send out emails
- Integration with the Informatica Cloud data integration hub also monitored
- After results & player behavioral & churn predictions are satisfactory, system can be automated
- The system's effectiveness will be monitored, documenting bottlenecks, problems & areas for improvement.

User Enablement

User Acceptance

Critical user acceptance criteria for the new system includes:

Marketing Managers	Instead manually sending out emails, use the Yokozuna dashboard to view list of customers likely to churn & customize marketing campaigns
Marketing Managers	Instead of manually creating useful information from data and visualizations from the Oracle database, they will use the Tableau dashboard for useful analytics

Training

- ISMT team members implementing new system will train team members to be "experts" on the system including Informatica Integration Hub user interface & Yokozuna dashboard
- "Experts" on hand, every shift, 24/7 providing support & to answer questions
- Knowledge Base created to document problems & issues & as a source of FAQs & answers

Data Scientists and Developers
- 2 weeks training on Informatica & Yokozuna: leveraging data lake through data processing & storage on Hadoop; data integration; managing the hybrid workflows & integration across cloud apps, big data & on-premise systems & user interface

Marketing Managers
- 2-3 days of training to use the Yokozuna analytic software to predict LifeSpan, churn & optimize marketing efforts & to use the Informatica user interface for self-service access to data

Service Desk Operators
- 2-3 days on user support, questions users may have, types of problems that may arise, differences old system vs new & how to maintain knowledge base

Success Metrics

Metrics	Success Criteria
● Customer Churn	● A decrease of 2 percentage points
● Incentive Program Success	● Increase the conversion rate of new customers by 5 percent
● Model Accuracy	● It is calculated using : Correct Predictions/Total Predictions ● Target is 80%

Thanks!

Any questions?