Serverless and Stateless Gaming Applications

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One Book One Northwestern

NU Predicts
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NU Predicts

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Harlan Wallach, Associate Director Northwestern Information Technologies

Development Team:

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Questions

“Will the Cubs win the World Series?”

“Will Democrats have a majority in the Senate after the election?”
“The answer to one of these questions is no, and the answer to the other one is yes.”

- Nate Silver
The answer to one of these questions is no, and the answer to the other one is yes.”

- Nate Silver
## Results

1. **“Will the Cubs win the World Series?”**
   - 250 NO
   - 41.9% YES
   - 180 YES

2. **“Will Democrats have a majority in the Senate after the election?”**
   - 115 NO
   - 73.4% YES
   - 318 YES
NU Predicts
The 2016 Election
# NU Predicts

The 2016 Election


<table>
<thead>
<tr>
<th>NU Predicts</th>
<th>NU Predicts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play Game</td>
<td>Results</td>
</tr>
</tbody>
</table>

"Will Hillary Clinton win a majority (more than 50%) of the overall popular vote?"

Your Prediction: YES  
Result: NO

529 No  
64.6% Yes  
971 Yes

"Will voter turnout (as a percent of the voting age population) be greater than it was in 2012?"

Your Prediction: NO  
Result: NO

537 No  
63.8% Yes  
948 Yes

"Which candidate will win Ohio?"

Your Prediction: CLINTON  
Result: TRUMP

873 Clinton  
59.5% Clinton  
592 Trump

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Ryan Stork</td>
<td>8,992 pts</td>
</tr>
<tr>
<td>#2</td>
<td>Ari Levin</td>
<td>8,716 pts</td>
</tr>
<tr>
<td>#3</td>
<td>Tristan Rix</td>
<td>8,087 pts</td>
</tr>
<tr>
<td>#4</td>
<td>James Schuller</td>
<td>8,003 pts</td>
</tr>
<tr>
<td>#5</td>
<td>Suning Wang</td>
<td>7,731 pts</td>
</tr>
<tr>
<td>#6</td>
<td>Michael Kundid</td>
<td>7,632 pts</td>
</tr>
</tbody>
</table>
NU Predicts
The 2016 Election

NUpredicts
Survey Question 2/21
Do you plan to vote in the 2016 Presidential Election?

NUpredicts
Survey Question 3/21
If the presidential election were held today, and assuming you were eligible, for whom would you vote?
Northwestern University
Organizational support provided by:

- Buffett Institute
- Study Abroad Office
- Office of the Provost
- University Libraries

- Candy Lee, Professor,
  Medill School of Journalism, Media, Integrated Communications,
  Northwestern University

- Austin Chambers,
  Student, Northwestern University

- Claude Azurin,
  Student, Northwestern University

- Rodolfo Vieira,
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- Kelsey Rydland,
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- Nick Gertonson,
  Web and Mobile Designer, Northwestern University, Northwestern University IT Academic and Research Technology

- Chris Widman,
  Production Manager, The Daily Northwestern

-Harlan Wallach
Associate Director, Northwestern Information Technology
Faculty Innovation Project
The Geo Game

• Concept
  • Improve Geographic Knowledge

• Design
  • Country Based
  • Geographically Aware
  • Fun Fact To Improve Retention
Faculty Innovation Project

*The Geo Game*

- Implementation
  - Promotion
  - Audience
- Evaluation & Assessment
  - Data Gathering
  - Post Quarter
Wildcat GeoGame Usage

<table>
<thead>
<tr>
<th>Group</th>
<th>Winners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>116</td>
</tr>
<tr>
<td>Faculty</td>
<td>5</td>
</tr>
<tr>
<td>Staff</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
</tr>
</tbody>
</table>
NU Predicts Usage

Sessions: 3,066
Pages / Session: 5.16
% New Sessions: 39.56%
Librarians: 1,585
Avg. Session Duration: 00:05:24
Bounce Rate: 35.81%
Players: 15,806

Returning Visitor: Blue
New Visitor: Green

Chart shows usage trends over time, indicating peak usage in mid-September.
NUpredicts Platform Architecture
AWS Architecture

End Users

Game (HTML/JS/SCSS)

API Gateway

Lambda (reads)

Identity Access Management

DynamoDB

Simple Queue Service

Simple Storage Service (S3)

Cloudfront

LOGIN WITH YOUR NETID

Northwestern Data Center

Single Sign On

Mobile

Tablet

Laptop
Identity Management

- Authentication via Single Sign-On
- Directory Services (Active Directory)
- Harvesting of federated user metadata
  - Directory
  - SES
- Aggregation of results by:
  - School
  - Department/Unit (staff)
  - Role (Faculty, staff, student).
AWS Orchestration of Services

Realtime UI/UX

Scoring System
“SCALABILITY - ability of a system to increase the workload on its current hardware resources (scale up); ELASTICITY - ability of a system to increase the workload on its current and additional (dynamically added on demand) hardware resources (scale out); Elasticity is strongly related to deployed-on-cloud applications.”
### AWS Cloud Costs

<table>
<thead>
<tr>
<th>On Prem: Fixed Costs</th>
<th>Cloud: Pay as you Go</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Traditional Stack</td>
<td>• Serverless Architecture</td>
</tr>
<tr>
<td>• Maintenance.</td>
<td>• AWS Lambda</td>
</tr>
<tr>
<td>• Operating Systems</td>
<td>• NoSQL database</td>
</tr>
<tr>
<td>• System Level</td>
<td>• Automate Snapshots</td>
</tr>
<tr>
<td>• Application Layer</td>
<td>• API Gateway and Security</td>
</tr>
<tr>
<td>• Redundancy</td>
<td>• Scalability</td>
</tr>
<tr>
<td>• Backup and Failover</td>
<td>• High Availability</td>
</tr>
<tr>
<td>• Disaster Recovery</td>
<td></td>
</tr>
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</table>
Next Stages of Development

1. Creator Experience

2. Administrative Interface
   Reporting and Data Visualization Metrics

3. Learning Tools Interoperability Component
Next Stages of Development

Creator Experience

- Build Intuitive UI/UX playground for creating game instances.
- Enable end-users to create their own prediction games.
- Publish game instances as standalone web apps or embeddable widgets.
Next Stages of Development

Administrative Interface

- User and Group Management
- Reporting Tools
- Data Visualization Metrics
- API to access the exported data.
Next Stages of Development

Learning Tool Interoperability (LTI)

- Build LTI component
- Enable integration of the NUpredicts platform with Learning Management Systems:
  - Instructure Canvas
- Faculty creates and manages all the content and end-user experience.

from imsglobal
Next Stages of Development

LT|I / App Store

• Offer the NUpredicts via the LTI / App Store.
• Any faculty member can ‘enable’ it for their course.
Faculty Engagement

Pilot Project for integration with Canvas

- Faculty Buy-In.
- Early Adopters
- Distribute outside of Northwestern
Questions?