STUDENT INTERNATIONAL BUSINESS COUNCIL

Spring 2020

Microsoft

What is **S**tudent **I**nternational **B**usiness **C**ouncil?

- Largest Student-Run Organization on Campus
- Amidst 30th Academic Year
- Divisions Including: Consulting, Finance, Marketing, STEM, Social Entrepreneurship
- Credo of "Peace through Commerce"

BUSINESS IS NOT JUST TO MAKE MONEY; IT'S ALSO TO CREATE A BETTER WORLD. AND THE BEST OF ALL WORLDS WOULD BE A WORLD AT PEACE.

- Rev. Theodore M. Hesburgh, C.S.C., President Emeritus, University of Notre Dame

Project Overview

- **Project Overview**
- **General Offering**
- **UC System Partnership**
- **Azure University Portal**
- **Competitive Analysis**
- **Our Azure Experience**

Overview

Microsoft Cloud Computing

- Azure is currently used by **95% of Fortune 500 companies.**

Opportunity for the Younger Generation

- However, a surprising amount of colleges and universities do not use Azure.

How can Azure expand to young developers?

- Partner with universities across the globe to provide a unique tool to make learning more efficient at an extremely low cost.

Current Roadblocks

Students

- Steep learning curve
- Access to resources
- Unaware of cloud applications
- On your own

Universities & Professors

- Existing infrastructure
- Non cloud computing courses
- Smooth Integration
- Account management

Several roadblocks to increase college student usage of cloud computing exist both on the individual student exploration level and on the University and professor adoption level.

Proposed Solution

Create University centered Cloud Computing offering

Appeal to Universities through cost and ease of integration and management

Use University and Professors to reach large base of Students

Create centralized Cloud Computing hub for students

General Offering

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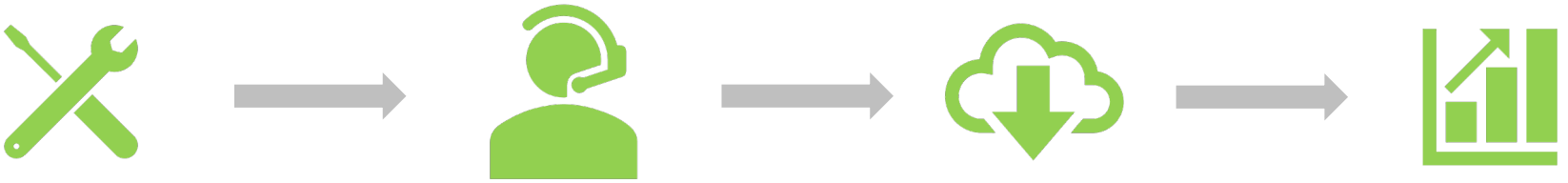
General University Offering Strategy

Timeline



Finish interface development

Contact OIT personnel with established relationships

Sell Azure and reevaluate based on arising bugs

Scale platform to universities without Microsoft relationship

Selling Strategy

- Utilize established university relationships
- Tiered pricing model
- Capitalize on changing circumstances

Selling Points

- 5 times cheaper than AWS
- Compatibility with all Microsoft apps
- Flexibility with other cloud providers

Marketing

- Target OIT personnel at universities
- Focus on admin automation as a source of differentiation
- Utilize Github's platform

Microsoft should try to launch Azure's general university offering as soon as possible in order to capitalize on coronavirus forcing many universities to transition to cloud-based systems.

Tiered Pricing Model

Undergraduates	Graduate Students	Professors
50% of pricing	30% of pricing	20% of pricing
75 students: the average class size	20-40 students: the average class size	Disproportionate amount of work
Majority of those using software	Universities can reflect costs in tuition	Higher price for better professor portal

How Will This Work?

Upfront costs to schools based on estimates of class size and usage

Long Run Plan

Change marginal billing to stay consistent with tiered pricing model

Microsoft could utilize a tiered pricing model in order to maximize prices by keeping in mind university selling points.

UC System Partnership

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Azure and University of California System

UC System

Over 285,000 Students
- >18% international
- 10 campuses
- 3 of top 5 public universities

Research-Driven
- 3 of top 10 US research universities
- 80,000 undergraduates involved in research

Location
- Major areas, including Bay Area, LA, and San Diego
- Silicon Valley
- Global technology hub

Key Objectives

- Accelerate academic research using cloud-computing capabilities
- Integrate quickly by leveraging existing Microsoft infrastructure
- Implement Azure in classroom setting to increase student familiarity

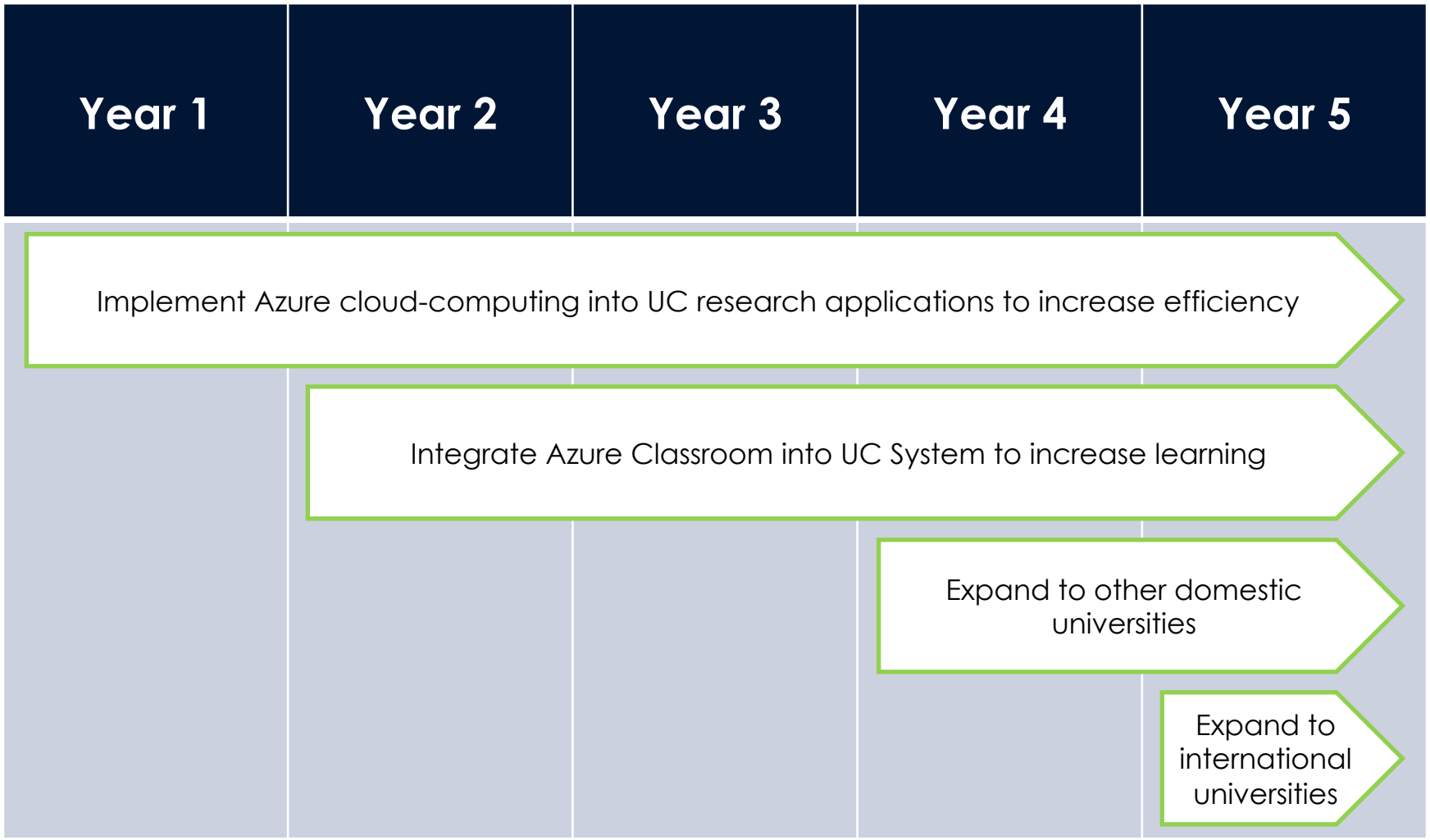
Partnership Impact

Increase Azure customer base and reach through implementation into both domestic and international universities

A university partnership with the University of California System results in an increase in Azure customer base through implementation into domestic and international universities

Source: Microsoft, University of California

Partnership Timeline



Full Azure integration into University of California System will take five years, with plans to expand to other universities starting in year four.

Source: Microsoft

Pricing Details for UC System

Estimated Needs

35000+ computer science and engineering students

6h per week X 16 weeks = 96 hours

96h X 35000 students = 3,360,000 hours

Schedule Preference

Most classes take place between 8am and 8pm = 12h per day

Service access can be limited to 12h per day, total cost will be lower than full day access

Flexible plan with different options to optimize costs

1

3,360,000 hours

↓

3-year Reserved pricing General Purpose ($0.037h)

↓

$124,320 (Per year)

+

2

Pay as you go for necessary expansions at $0.1 per hour

+

3

Spot pricing as available From $0.0125

A flexible pricing structure is used to provide service. By offering service only during a limited timeframe, prices can be reduced as workload is lower.

Sources: Azure, UC

Value Proposition: Future Users

Azure

Over 35000 computer science and engineering students

Students get recruited by top technology companies

Easier to implement Azure into these companies. More Azure clients

These students who learn Azure are hired by major companies. Then the companies choose Azure over other cloud services, as their employees already know how to use it.

Azure University Portal

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Azure Student Portal Overview

A platform designed specifically for college students. The goal of the portal is to expose and teach students about Azure and cloud computing topics in a friendly centralized environment. The portal aims to connect students with the broader technology network.

Learn

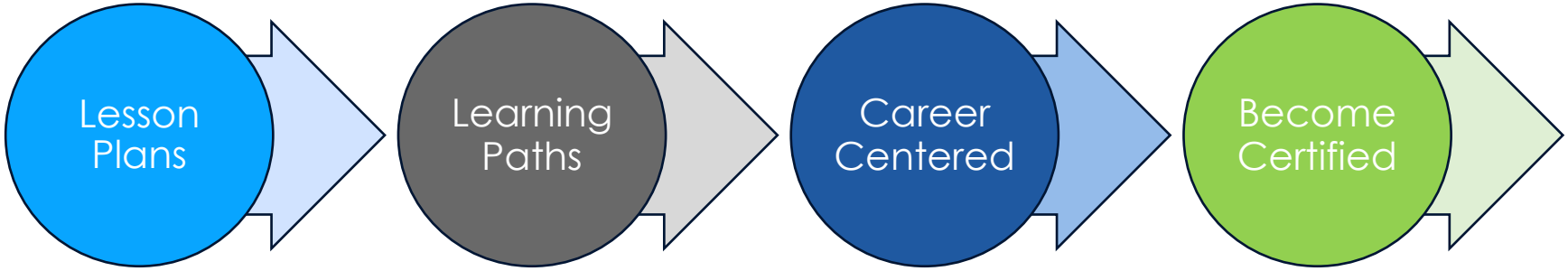
Create

Classroom

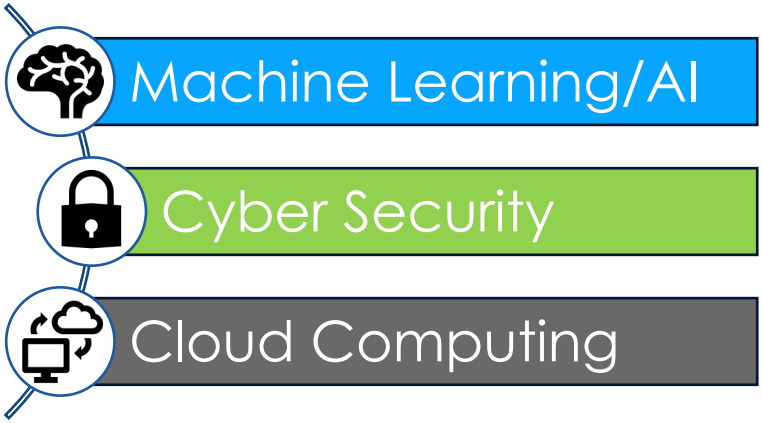
Network

Learning Modules

Module Trajectory



Concentrations



Interactive

- Visual Studio
- Azure Notebooks
- Azure CLI
- Microsoft Office

Microsoft's Learning Modules can be implemented in the student portal to facilitate career growth, development, and curiosity in all that Azure has to offer.

Create

Project Trajectory

Learning Modules → Class Projects → Guided Activities → Freeform Projects

Azure Toolkit

- Machine Learning
- Data Science
- Cloud Computing
- Programming Languages

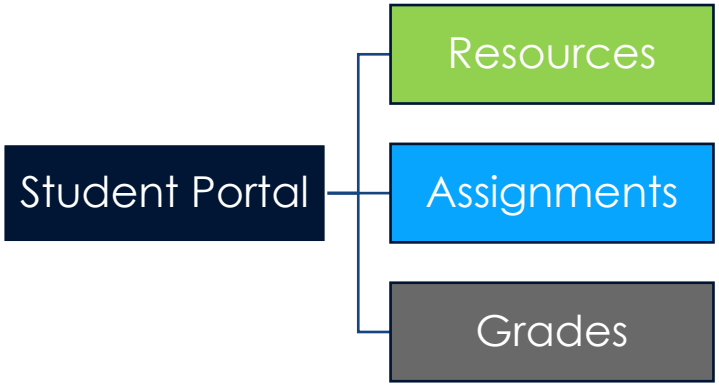
Student Portfolio

- Class Projects
- Assistance Given
- Individual Projects
- Efficiency Submissions

In the "Create" feature of the student portal, students will be able to create individual projects or class projects while viewing their student portfolio and all the tools at their disposal for easy organization.

Classroom

Dashboard



Virtual Capabilities

- Allows Online Collaboration
- Video Conferencing

Assignments

Links Professor Dashboard

↓

Receive help via messenger

↓

Submit work through GitLab

The Classroom features the central hub in which students will be able to interact with their assignments and classmates harnessing new heights in technology.

Network Board

Programming Assistance

Threads & Subtopics
- Place for students to discuss different aspects of computer science.

Help and Insight
- Question and Answer board for problems on the learning modules.

Solutions Board
- Share solutions to find the most efficient way to solve the problem.

Point System
- Earn points by helping other students, incentivizing forum activity.

Career Development

Students will have the ability to present and link their…

- Student Portfolios
- GitHub Account
- LinkedIn Account

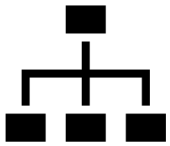
This, in turn, gives them the ability to view company…

- Job Postings
- Desired Skills

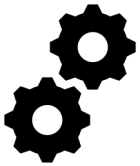
With the Network Board feature of the Azure student portal, students will be able to connect with each other to create solutions to problems, and to potential employers seeking top-tier talent.

Professor Dashboard Overview

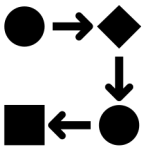
An interface designed for professors to effectively integrate and manage Azure in their courses. The goal of this solution is to increase the number of professors using Azure in their courses to thus increase the number of students using Azure.



Account management



Environment setup



Assignment submission

Integrated auto-grading

Account Management

Components

Manage resource usage

- Ability to identify computing usage
- Close inefficient processes

Monitor assignment progress

- Look at student projects and give feedback
- Restrict Azure resources for projects

Pains it Improves

- Inefficient resource allocation
- Overwhelming resources to choose from
- Unknown student project progression

Benefits

Dynamic Feedback	• Live visual progress reports
Cost Reduction	• Capability to close unattended VMs
Customization for Classes	• Narrow in focus on certain concepts

The Account Management feature allows professors to manage cost of the platform while still delivering highly customizable lesson plans to students.

Environment Configuration

Components

Customize template to standardize environment

Specific compilers, libraries, and packages uploaded

Students download customized templates

Pains it Improves

- Loss of classwork time
- Lack of standard across projects
- Debugging same issue multiple times

Benefits

Focus on Material	• Abstract setup hardware
Cohesive Projects	• Projects more in tune with course goals
Saves Time	• Setup issues all but eliminated

The Environment Configuration feature allows professors to introduce a standardized environment that eases project implementation.

Assignment submission

Components

Automatic submission to Git upon saving.

Seamless connection to Git for automatic VM downloads.

Allow integrated projects between students using VS Online

Offerings

Virtual Machine and Git integration

Cloud based assignment storage and interaction

Benefits

Streamlined Classes	• The website allows for a simplified submission process
Remote Readiness	• Increases ease and speed of transition to remote submissions
Customization for Classes	• Allows for easier manipulation of computing source

By allowing for the integration of cloud-based assignment submission, workflow is streamlined and standardized

Source: Azure DevOps

Integrated auto-grading

Components

Offerings

- Universities
- Bootcamps
- Hackathons
- Internship Programs

Benefits

- Expedites classroom advancements
- Improves student-teacher interactions
- Transfers focus to more important classroom details
- Simplifies classroom experience

By integrating cloud-based, auto-grading, the assignment submission process is expedited, simplified, and made more transparent.

Sources: Azure Solutions

Competitive Analysis

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Comparison of Cloud-Computing Market Share Leaders

Microsoft Azure

Market Share: 15 %

+	−
Lower cost than competitors	7x more downtime hours than AWS
Used by >95% of Fortune 500 companies	Lacking in available tech support
Easy implementation into enterprises using other Microsoft technologies	Limited range of customer profiles
Through Azure Hybrid Benefit, companies have reduced costs by up to 82%	Not capable of servicing as many users as AWS

aws

Market Share: 34 %

+	−
Market share leader in the public cloud market	5 times the cost of Azure for Windows and SQL servers
Oldest major service	Available in fewer regions than Azure
Most capable of servicing large number of users, used by Netflix and Spotify	Difficult integration with other software
Broad range of customer profiles	High data access costs within cloud storage

Both Azure and AWS have pros and cons, with Azure having a lower cost while being less reliable and AWS being the most established service while being 5x the cost of Azure.

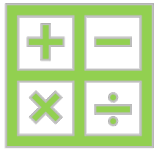
Source: Microsoft, Amazon, Gartner

Azure vs. AWS Price Comparison

UC University System

35,000 UC Comp Sci Students

6 hours of class work per week: 3 class, 3 homework



35,000 x 6 x 16 = 3.36 million hours for one semester

Azure

Our Offering

- 3-year reserved pricing general purpose ($0.037h)
- **$124,320 (per year)**

+

Pay as you go for necessary expansions at $0.1 per hour

Spot pricing as available From $0.0125

AWS EC2

Low-End	Middle-End	High-End
• 3-year savings plan ($0.065h) • **$218,400 (per year)**	• 3-year convertible reserved instances plan ($0.0749h) • **$248,668 (per year)**	• 3-year on-demand instances plan ($0.1504h) • **$505,344 (per year)**

Azure is price competitive with AWS as all three of AWS' price points would be far more expansive than Azure's offering to Universities.

Azure, AWS, AWS

Comparative Analysis: Pricing

Yearly Pricing

Azure	AWS	Google Cloud
3-year Reserved pricing General Purpose ($0.037h)	3-year Reserved pricing General Purpose ($0.041h)	3-year Reserved pricing General Purpose ($0.043h)
$124,320 (Per year)	**$206,000 (Per year)**	**$216,720 (Per year)**

Spot Pricing

Azure	Google Cloud	AWS
From $0.0125	From $0.02	From $0.0278

< <

The base price in Azure supposes a 3% and 8% savings respectively over AWS and Google Cloud

Sources: Azure, AWS, Google Cloud

Our Azure Experience

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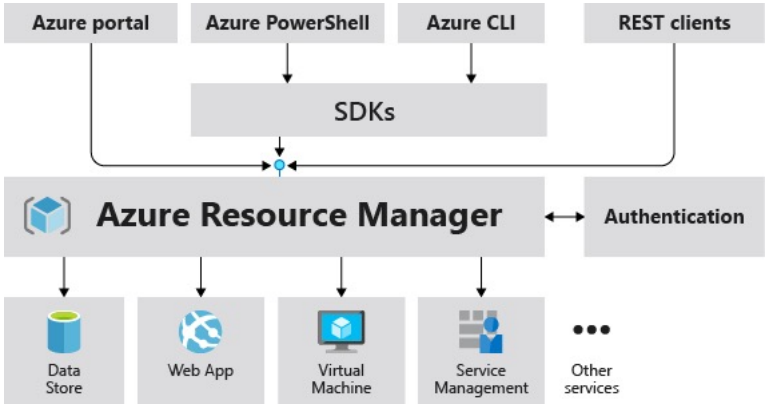
Azure Resource Manager



VM Configurement

Environment setup

Rapid, uniform deployment

Resource definition

Using the Azure tutorial, I was able to use a quickstart template to easily deploy a basic website. Using the quickstart templates, I learned you are able to manage resources amongst VM's.

ND Bot

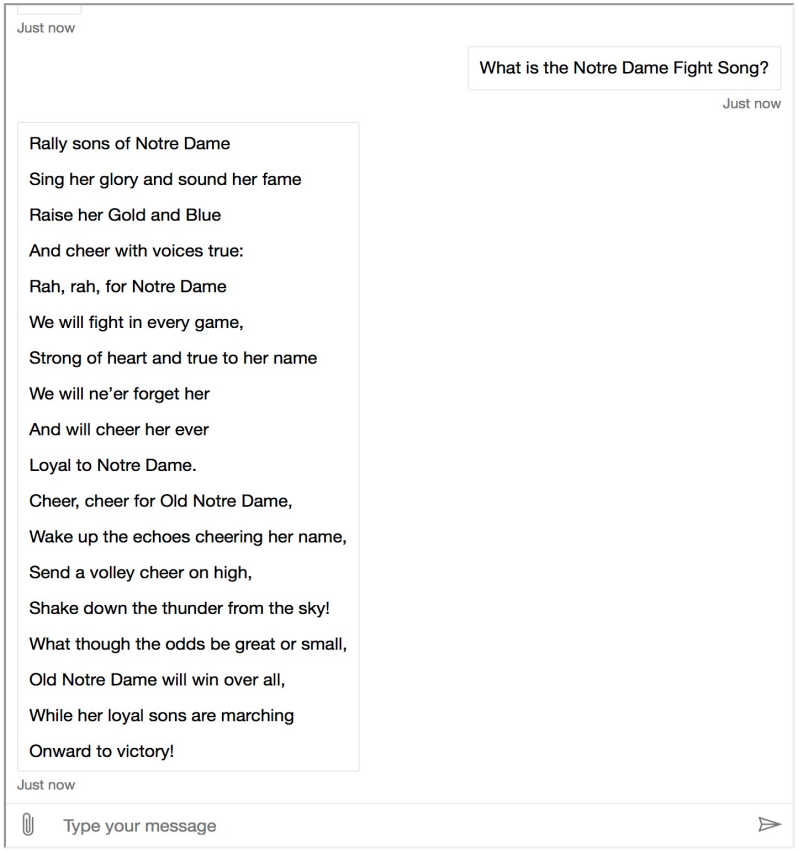
Implementation

QnA Maker
- Created Notre Dame KB

Azure Bot Service
- Linked KB to Azure Bot

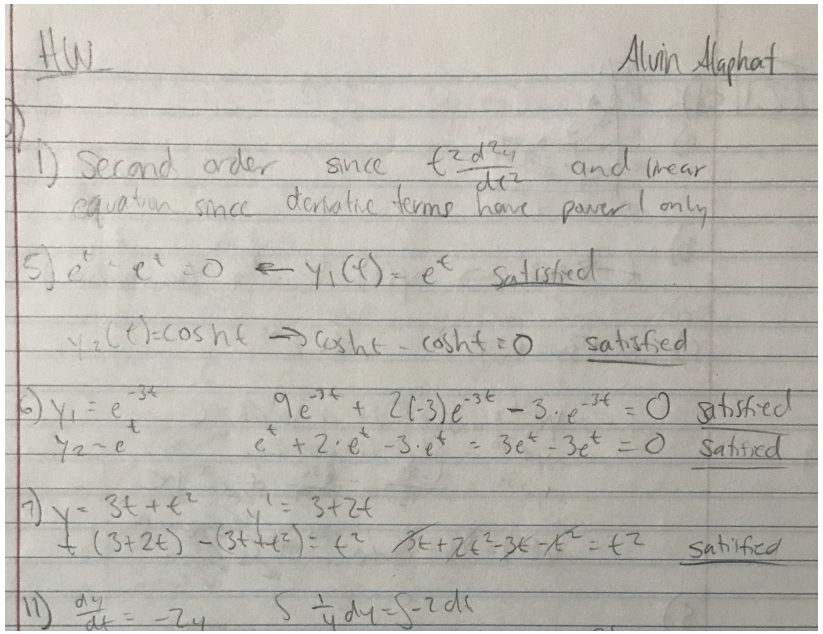
HTML
- Embedded Web Chat into Static Site

Results



The learning modules allow for rapid learning and implementation of Azure concepts.

Auto Grading - Tech Demo



Student Turns in Homework/Test → Text Extraction With Computer Vision → Work is Extracted, Translated to PDF

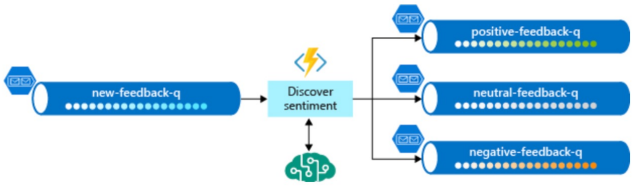
Azure offers important capabilities including virtual machines, computing power, and media hosting, but can improve by offering a cloud-based computing service for developers or an interface for research data.

Source: Microsoft , Alvin Alaphat

Sentiment Analysis of Modules

A solution based on Azure Functions, Azure Queue Storage, and Text Analytics API

The following diagram is a design proposal for a solution. It uses three core components of Azure: Azure Queue Storage, Azure Functions, and Azure Cognitive Services.

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Strict-Transport-Security: max-age=31536000; includeSubDomains; preload
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Date: Fri, 17 Apr 2020 03:29:04 GMT
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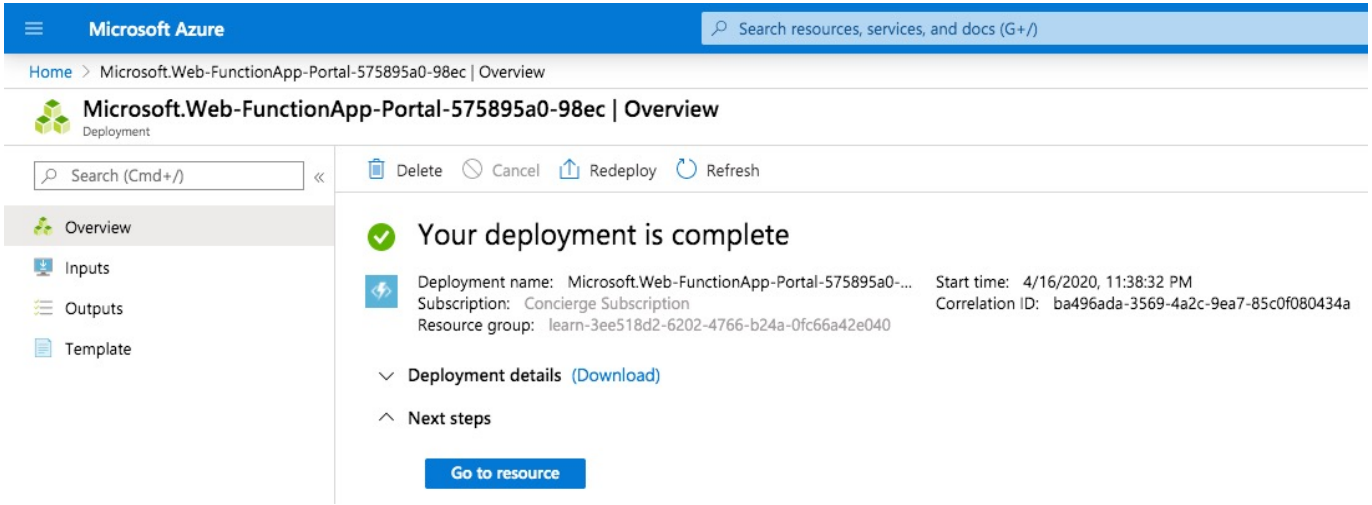

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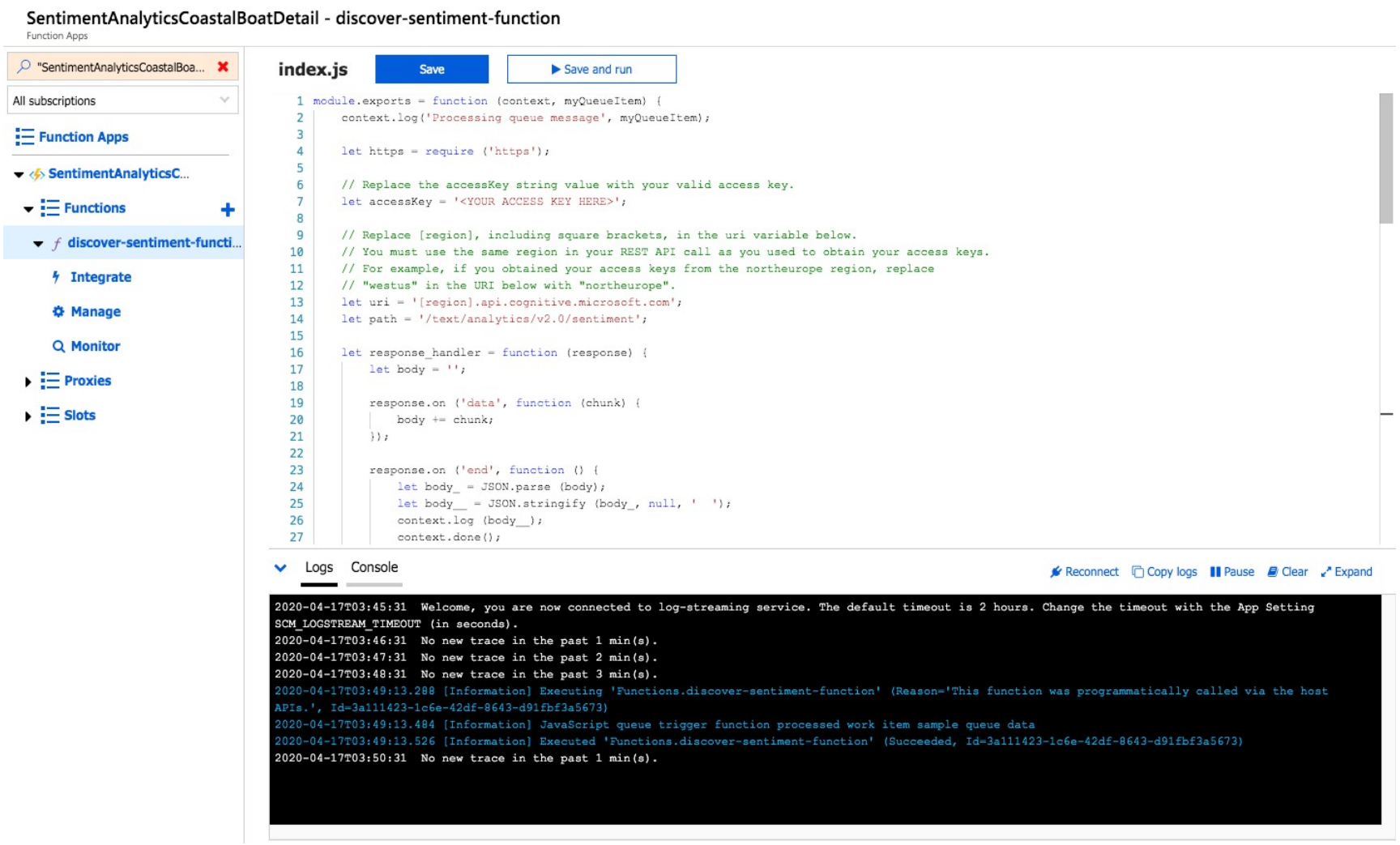

Thank you!

QUESTIONS?

Link to Azure University Interface

https://yld.me/aEEi