

# CSCI 2690 Intro to Software Projects

## Project Capstone Closing Report

Team K

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# Project Overview

## Project Access

**Github Repo:** [https://github.com/Wgeorge13/CSCI2690\\_Assignment2](https://github.com/Wgeorge13/CSCI2690_Assignment2)

**Planning meeting:** <https://dalu.sharepoint.com/:f:/r/teams/CSCI2690Fall2021-TeamK-BlogWebsite/Shared%20Documents/Team%20K%20-%20Blog%20Website/CSCI2690-Capstone%20Project-PlanningMeeting?csf=1&web=1&e=kcBD5m>

**Stand-up meeting:** <https://dalu.sharepoint.com/:f:/r/teams/CSCI2690Fall2021-TeamK-BlogWebsite/Shared%20Documents/Team%20K%20-%20Blog%20Website/CSCI2690-Capstone%20Project-StandUp-Meeting?csf=1&web=1&e=K1Iukv>

**Review meeting:** <https://dalu.sharepoint.com/:f:/r/teams/CSCI2690Fall2021-TeamK-BlogWebsite/Shared%20Documents/Team%20K%20-%20Blog%20Website/CSCI2690-Capstone%20Project-Review-Meeting?csf=1&web=1&e=zsaGCe>

**Retrospective meeting:** <https://dalu.sharepoint.com/:f:/r/teams/CSCI2690Fall2021-TeamK->

[BlogWebsite/Shared%20Documents/Team%20K%20-%20Blog%20Website/CSCI2690-Capstone%20Project-Retrospect-Meeting?csf=1&web=1&e=Q3w0Tb](https://dalu.sharepoint.com/:f:/r/teams/CSCI2690Fall2021-TeamK-BlogWebsite/Shared%20Documents/Team%20K%20-%20Blog%20Website/CSCI2690-Capstone%20Project-Retrospect-Meeting?csf=1&web=1&e=Q3w0Tb)

## Project Description

This project's full name is CSCI 2690 project capstone. The project is provide software solution by GCP, GKE engine and ISTIO. Google Cloud Platform (GCP), offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search, Gmail, Google Drive, and YouTube. Alongside a set of management tools, it provides a series of modular cloud services including computing, data storage, data analytics and machine learning. Registration requires a credit card or bank account details. Docker is a platform as a service (PaaS) product set that uses OS-level virtualization to deliver software in packages called containers. Containers are isolated from one another and bundle their own software, libraries, and configuration files; they can communicate with each other through well-defined channels. Google Kubernetes Engine (GKE) is a management and orchestration system for Docker container and container clusters that run within Google's public cloud services. Google Kubernetes Engine is based on Kubernetes, Google's open source container management system. ISTIO is an open service mesh that provides a uniform way to connect, manage, and secure microservices. It supports managing traffic flows between services, enforcing access policies, and aggregating telemetry data, all without requiring changes to the microservice code. This team also used many tools to support the project development. These tools included software such as the Microsoft Office Suite,

Azure DevOps, and GitHub, among the most relevant. After iteration 1, the team completed the project goals and implemented a function for the course.

## Technology Stack

In the modern Software development process and company server solution, cloud platform is the most popular choice for many company. Cloud platforms hide the complexity and details of the user and application infrastructure by providing a very simple graphical interface. Clouds are transparent to users and applications, and they can be built in a variety of ways. Typically, they are built on a cluster of PC servers combined with internal applications and system software. Cloud computing enables companies and applications that rely on system infrastructure to maintain less infrastructure and instead use cloud infrastructure as "infrastructure"; As a result, these companies can save money and operational investment.

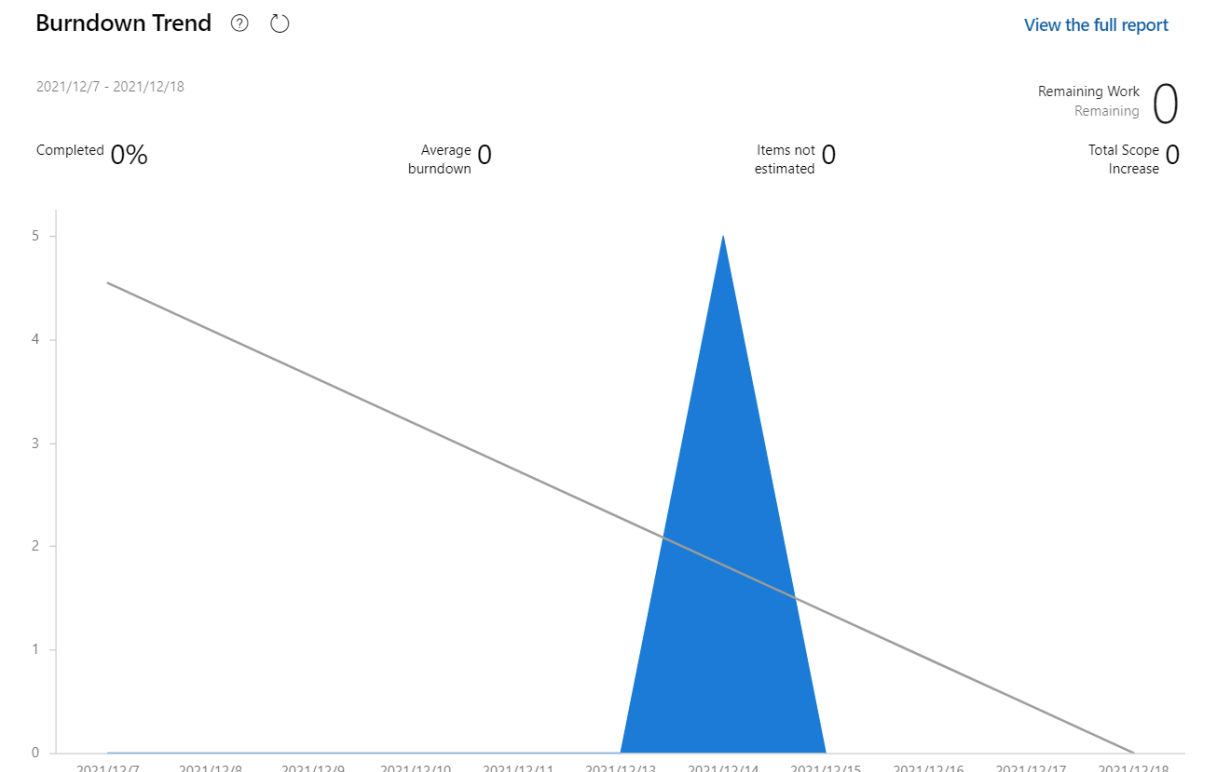
## Project Value

Working on this project provides significant value to the development team. It incorporates many aspects of DevOps development and includes team members with experience similar to developing in the industry. The project uses the industry-standard tool Docker and GCP, and the most popular developed software such as Postgres SQL, and JS. The most important is we need to learn and prepare for possible difficulties and crises. Requirement per member of team and make sure to develop issue logs risk register and treatment plan according to our project.

Throughout the development process, the team consistently encountered features that required learning new concepts in order to implement. Once the requirement of the assignment was completed, the iterative development process was used to promote constant learning, improvement, and teamwork. This was further organized by using tools such as Git and Azure. The value of this project is that it provides students with the opportunity to effectively learn skills that are very applicable to development in general. The students also learned team dynamics and collaborative work environments with teams structured as they may be in the industry

## Burn Down Chart

### Iteration1



## Outcomes

### Should we move to GKE? Why?

Customers should move to Google Kubernetes Engine and activate ISTIO. Google Kubernetes Engine is a management system and can be orchestrated. The main problems faced by customers are related to scale. According to Rob and Maciek (2020), they introduced several important features of Google Kubernetes Engine, "clusters with up to 15,000 nodes", and "If you're running large, internet-scale services; If you need to simplify infrastructure management by having fewer clusters to manage; Batch processing — shortening the time needed to process data by temporarily using much more resources". These features mean that Google Kubernetes Engine can help companies solve the problem of scale and improve the company's efficiency by reducing the number of clusters managed and increasing the speed of data processing. In addition, Google Kubernetes Engine can help maintainers and developers to automatically maintain and repair nodes, which is very convenient and highly secure. In addition to using Google Kubernetes Engine, customers also need to activate Istio. According to istio (n.d.), "Istio's powerful features provide a uniform and more efficient way to secure,

connect, and monitor services. "This means that combining Google Kubernetes Engine and Istio can improve scalability and monitor and maintain products more efficiently. Quality and improve user experience.

## What are the list of services that we need to activate on GCP?

Google Cloud services:

- 1-Compute Engine [1]
- 2-App Engine [1]
- 3-Container Engine [1]
- 4-Container Registry [1]
- 5-Cloud Functions [1]
- 6-Cloud Pub/Sub [1]
- 7-Cloud Endpoints Frameworks for App Engine [1]
- 8-Cloud Storage [1]
- 9-Cloud SQL [1]
- 10-Bigtable [1]
- 11-Cloud Datastore [1]
- 12-Cloud Spanner [1]
- 13-Persistent Disk [1]
- 14-Cloud Source Repositories [1]
- 15-BigQuery [1]
- 16-Cloud Dataflow [1]
- 17-Dataproc [1]
- 18-Cloud Datalab [1]
- 19-Google Genomics [1]

- 20-Cloud Machine Learning [1]
- 21-Cloud Vision API [1]
- 22-Cloud Speech API [1]
- 23-Natural Language API [1]
- 24-Translate API [1]
- 25-Google Cloud Virtual Network [1]
- 26-Cloud Load Balancing [1]
- 27-Cloud CDN [1]
- 28-Google Cloud Interconnect [1]
- 29-Cloud DNS [1]
- 30-Google Cloud IAM [1]
- 31-Cloud Resource Manager [1]
- 32-Cloud Security Scanner [1]
- 33-Stackdriver [1]
- 34-Deployment Manager [1]
- 35-Cloud Shell [1]
- 36-Google Cloud Billing API [1]

In Assignment 2 , we have activated the google cloud services, which is google cloud shell services and and activate the Cloud SQL services, furthermore we also enabled the API service and google cloud service.

#### IEEE reference:

1-R. Meier, "What are the Google Cloud Platform (GCP) Services?," *Google Cloud - Community*, 10-Feb-2017. [Online]. Available: <https://medium.com/google-cloud/what-are-the-google-cloud-platform-gcp-services-285f1988957a>. [Accessed: 12-Dec-2021].

## What resources do I need to do this migration?

If a user needs access to a specific Google Cloud resource, you can grant the user a role for that resource. Some examples of resources are projects, Compute Engine instances, and Cloud Storage buckets.

Some services support granting IAM permissions at a granularity finer than the project level. For example, you can grant the Storage Admin role (roles/storage.admin) to a user for a particular Cloud Storage bucket, or you can grant the Compute Instance Admin role (roles/compute.instanceAdmin) to a user for a specific Compute Engine instance.

In other cases, you can grant IAM permissions at the project level. The permissions are then inherited by all resources within that project. For example, to grant access to all Cloud Storage buckets in a project, grant access to the project instead of each individual bucket. Or to grant access to all Compute Engine instances in a project, grant access to the project rather than each individual instance.

For information on what roles can be granted on which resources, see Understanding roles and refer to the Lowest Resource column for a given role.

In this deploying of migration to Google Cloud the first resource is need the system should have 10 core CPU and 32GM RAM it also should have user role for that can access to GCP as well . Some example of resources are Computer instances, Cloud Storage buckets. And also in different type of users there is have different resource required.

## What deployment pattern should I use to minimize the impact on my clients?

When deploying the new version of API, we also need to keep the old API environment running normally. Before deployment, we use the load balancer to point to the old API, and after the new API is ready, we can point the load balancer to the new API environment to achieve version update. If anything goes wrong at this point we can immediately roll back to the old version to restore the previous version. This approach is very fast for version switching and minimizes the risk of downtime. (Blue/Green Deployment Pattern)

## Issues

Access Link:

<https://dalus.sharepoint.com/:x:/r/teams/CSCI2690Fall2021-TeamK-BlogWebsite/Shared%20Documents/Team%20K%20-%20Blog%20Website/ProjectCapstone/Risk%20register.xlsx?d=w83d3d32d35614782a9ff33169e06c641&csf=1&web=1&e=J1BZHG>

## Risk Register



Title	Category	Description	Probability	Impact	Ways to decrease risk	
Time conflicts	Time	Most team members have other exams and assignments to finish this period.	medium	high	Set up extra meeting time and communicate more frequent by teams or email	ZhihaoChen
Team Collaboration	Environment	It is a little bit difficult to have physical meeting due to the weather and fear of covid, but physical meeting is more efficient team collaboration.	medium	medium	We have to make more time to meet online and if we have the chance to meet of Hongjing Bian	Hongjing Bian
Azure problem	Azure	Azure have some bugs didn't show burn-down chart.	medium	high	Recommend reset azure or check azure setting.	Zicheng Wang
Unclear of the API environment	Environment	Not sure exactly what API environment the customer is using.	medium	high	Communicate with customers and try to understand this environment.	Boying Lei
System Migration	System	Not sure what system requirement or this migration need.	medium	medium	check system need and require	Zheng Wu

## Risk treatment plan

Risk Event	Action	Plan	Risk Owner	Resolve by
Time Conflicts	Reduce	Find another time for meeting and working on online documents	ZhihaoChen	ZhihaoChen
Environment Issues	Reduce	Update the whole system and Download the software that support the whole environment	Hongjing Bian	Hongjing Bian
Azure issue	Resolve	Check azure setting and credit the sprint page	Zicheng Wang	Zicheng Wang
API issue	Resolve	Use the information provided by the customer to try to understand the API environment he is using and learn how to move APIs	Boying Lei	Boying Lei
Source code issue	Resolve	Depoly source code and set up same version of system requirement	Zheng Wu	Zheng Wu

## Lessons Learned / Course Reflections

### Zicheng Wang's Lessons Learned

I think that I have learned many things during this semester that will be helpful in both an academic and professional environment. During this semester I was a developer, and this allowed me to work on both the front and backend of our project which enabled me to expand my coding skills further. In particular, my skills in Docker and GCP have greatly improved since the start of this semester, and this will be extremely helpful in my future career.

I also think my teamwork skills improved this semester as many of the tasks that I completed required me to work with other developers to complete many of my tasks. This not only improved my communication and problem-solving skills, but it allowed me to learn more about the tools that we were using from other team members. These were important lessons to learn as all development projects will require me to work in groups and by working on this project I feel better prepared to work on professional projects.

### Zhihao Chen's Lessons Learned

In this assignment, I learned knowledge other than project development. Specifically, in order to solve this assignment, I learned google cloud platform in depth, such as: features, advantages, etc. I also learned what Google Kubernetes is Engine, its main functions, features, etc. knowledge. And understand how it is combined with the google cloud platform to help the development team maintain and improve product quality and user experience. Our plan is more specific than previous projects, which helps us Resolve many small conflicts (time conflicts) so that we can deliver results on time.

### Hongjing Bian's Lessons Learned

The important of the time management and team coordination , as the the final is here, i have found that doing the assignment as early as possible is really benefiting , because as time

pass by different team mate have their final schedule , so it is really hard to find a common time in the final period and luckily when the capstone appears we fast taking the measures and divide the task to each person so that we could take our own pace to finish this , because of that so in the final week, we have not feel anxious and panic like other team

## Zheng Wu's Lessons Learned

In this study, I learned how to migrate the project to Google Cloud, but I found some problems of my own when reading the document, in which I found that I didn't know enough about the use of the cloud. It is impossible to get a good understanding of relevant specific knowledge, so there will be ambiguities in content cohesion relative to other parts. But on the bright side, through this project, I learned how to complete group activities more efficiently, and through communication and collaboration with group members, I can complete difficult tasks together. The experience of this project has brought me much more than that. When faced with a large project, before I divided the project into my own parts, and only completed my own tasks when it was completed. However, after learning agile development, cooperation between teams has accelerated the development speed. I will continue this development method in future studies and strive to apply it in my future work.

## Boying Lei's Lessons Learned

This project needs our own study to complete. We have to have some understanding of what we don't know, so we need to do a lot of information retrieval about it. From this point I looked at quite a bit of information, which improved my ability to filter out irrelevant and useless information. Next, I need to combine this information with the problems in the project to think about solutions. At this stage, it tested my ability to combine old knowledge with new knowledge. This project was a new challenge for me. I needed to build a solid bridge between my existing knowledge and my goal, and I learned a lot in the process of building it.

Reference: <https://www.techmagic.co/blog/best-application-deployment-strategies/>