
Sample Case Studies
for the Professional
Cloud Architect Exam

Course agenda

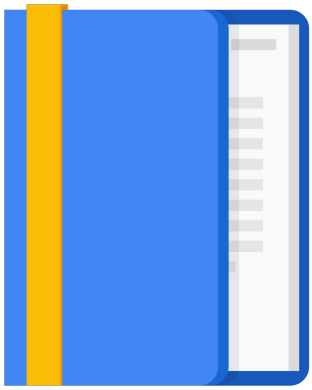
Module 1: Understanding the Professional Cloud Architect Certification

Module 2: Sample Case Studies for the Professional Cloud Architect Exam

Module 3: Designing and Implementing (Review and Preparation Tips)

Module 4: Optimizing and Operating (Review and Preparation Tips)

Module 5: Resources and Next Steps



Google Cloud

Worksheet: case study analysis template

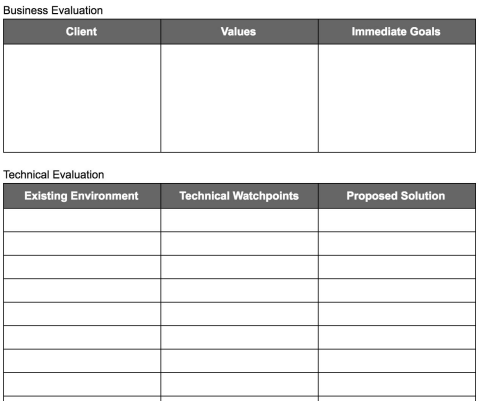
This worksheet is available for you use to practice analyzing cases.

The worksheet is available in both Google Docs and as a PDF.

The links are in your Qwiklabs resources.

Google doc link:
https://docs.google.com/document/d/1JtrKKkcq70ZS3A3_e_dVAURYfMttWxopnyZgTdYLMZo/copy

Short link:
https://goo.gl/XMHgKo



Business Evaluation

Client	Values	Immediate Goals

Technical Evaluation

Existing Environment	Technical Watchpoints	Proposed Solution

Google Cloud

It is recommended that you use a worksheet similar to the one provided to analyze cases, especially the sample cases provided for the certification exam.

https://docs.google.com/document/d/1JtrKKkcq70ZS3A3_e_dVAURYfMttWxopnyZgTdYLMZo/copy

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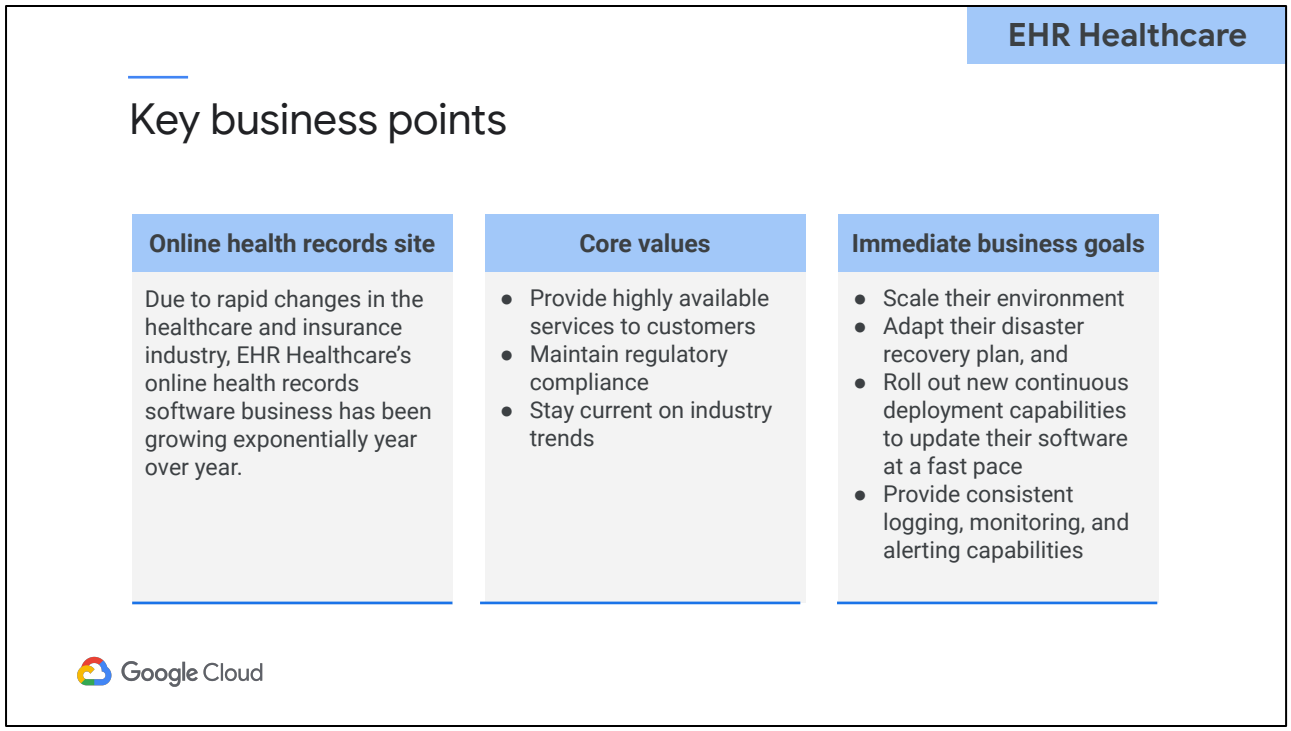
https://services.google.com/fh/files/blogs/master_case_study_ehr_healthcare.pdf

EHR Healthcare is a leading provider of electronic health record software to the medical industry. EHR Healthcare provides their software as a service to multi-national medical offices, hospitals, and insurance providers.



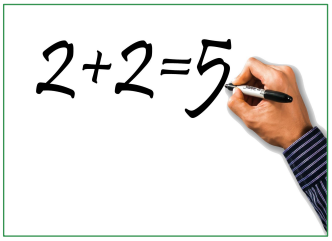
Solution concept
Due to rapid changes in the healthcare and insurance industry, EHR Healthcare's business has been growing exponentially year over year. They need to be able to scale their environment, adapt their disaster recovery plan, and roll out new continuous deployment capabilities to update their software at a fast pace.

Google Cloud has been chosen to replace their current colocation facilities.

Executive statement
Our on-premises strategy has worked for years but has required a major investment of time and money in training our team on distinctly different systems, managing similar but separate environments, and responding to outages. Many of these outages have been a result of misconfigured systems, inadequate capacity to manage spikes in traffic, and inconsistent monitoring practices. We want to use Google Cloud to leverage a scalable, resilient platform that can span multiple environments seamlessly and provide a consistent and stable user experience that positions us for future growth.

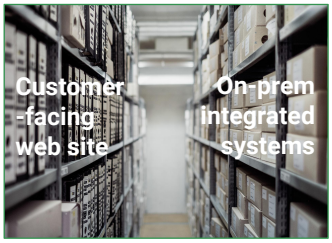
EHR Healthcare

Key business assumptions



Rapid changes and exponential growth in the industry will continue and analysis of these changes is necessary to the business

Strong focus on regulatory compliance, reduced latency, and excellent customer service required to meet business goals



On-prem legacy integrations with insurance providers will not be upgraded in the immediate future and will need to be supported as-is for now

Google Cloud

Business requirements

- On-board new insurance providers as quickly as possible.
- Provide a minimum 99.9% availability for all customer-facing systems.
- Provide centralized visibility and proactive action on system performance and usage. Increase ability to provide insights into healthcare trends.
- Reduce latency to all customers.
- Maintain regulatory compliance.
- Decrease infrastructure administration costs.
- Make predictions and generate reports on industry trends based on provider data.

EHR Healthcare

Technical evaluation

Existing Environment	Technical Watchpoints	Proposed Product/Solution
Customer-facing applications are web-based, and many have recently been containerized to run on a group of Kubernetes clusters.	Compute • Containerized applications • Needs to run in the cloud and integrate with on-premises systems • Autoscaling, low latency • Robust logging, monitoring and alerting required	
Software is currently hosted in multiple colocation facilities. The lease on one of the data centers is about to expire.	Storage • Multiple databases including MySQL, MS SQL Server, Redis, and MongoDB	
Data visualization • Nonexistent or minimal	Data needs • Fast on-boarding of insurance providers and their data • Data Analytics needed to predict industry and health care trends • 99.9% availability for customer-facing data systems	

Google Cloud

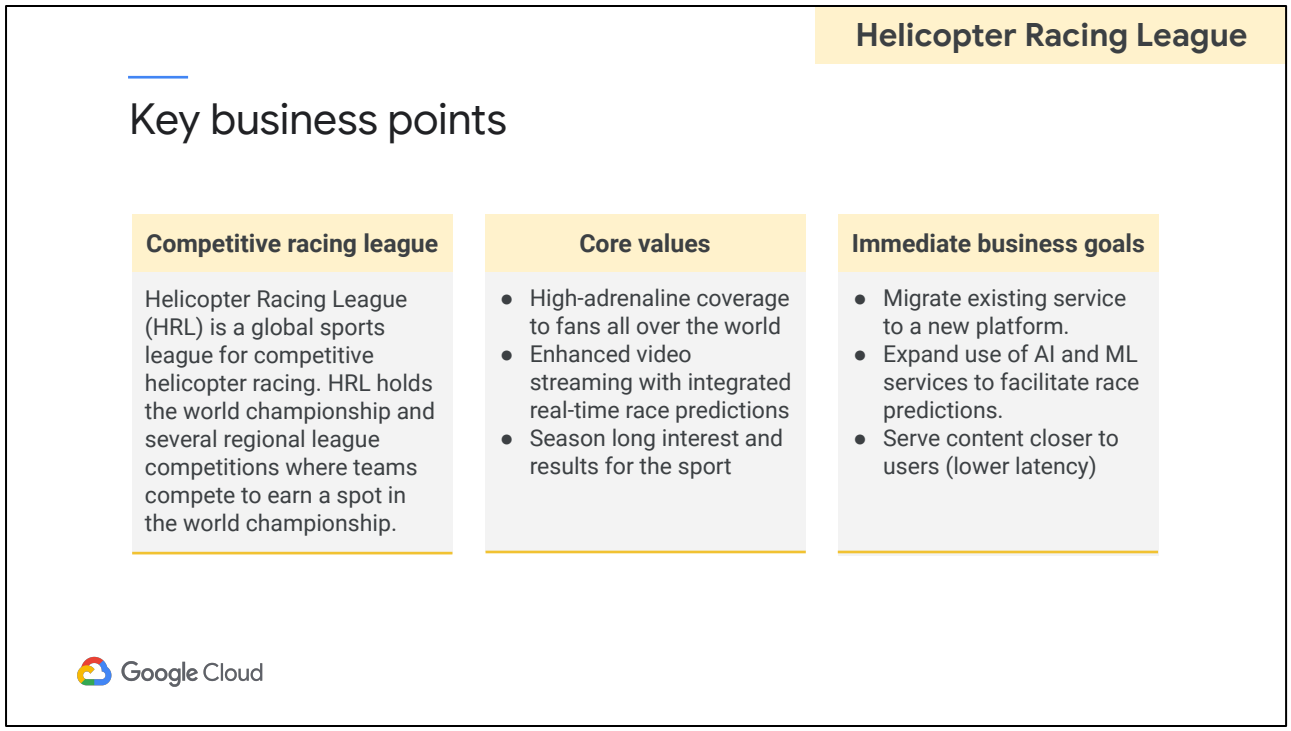
Technical Evaluation
EHR's software is currently hosted in multiple colocation facilities. The lease on one of the data centers is about to expire.

Customer-facing applications are web-based, and many have recently been containerized to run on a group of Kubernetes clusters. Data is stored in a mixture of relational and NoSQL databases (MySQL, MS SQL Server, Redis, and MongoDB). Company overview Solution concept

EHR is hosting several legacy file- and API-based integrations with insurance providers on-premises. These systems are scheduled to be replaced over the next several years. There is no plan to upgrade or move these systems at the current time. Users are managed via Microsoft Active Directory. Monitoring is currently being done via various open source tools. Alerts are sent via email and are often ignored.

https://services.google.com/fh/files/blogs/master_case_study_helicopter_racing_league.pdf

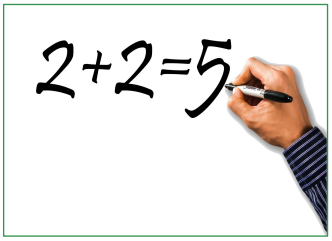
Helicopter Racing League (HRL) is a global sports league for competitive helicopter racing. Each year HRL holds the world championship and several regional league competitions where teams compete to earn a spot in the world championship. HRL offers a paid service to stream the races all over the world with live telemetry and predictions throughout each race.



Solution Concept
Due to rapid changes in the healthcare and insurance industry, EHR Healthcare's business has been growing exponentially year over year. They need to be able to scale their environment, adapt their disaster recovery plan, and roll out new continuous deployment capabilities to update their software at a fast pace. Google Cloud has been chosen to replace their current colocation facilities.

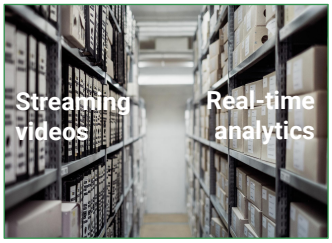
Executive statement
Our CEO, S. Hawke, wants to bring high-adrenaline racing to fans all around the world. We listen to our fans, and they want enhanced video streams that include predictions of events within the race (e.g., overtaking). Our current platform allows us to predict race outcomes but lacks the facility to support real-time predictions during races and the capacity to process season-long results.

Key business assumptions



Customers want real-time racing predictions and higher-quality broadcasts

Business focus should be on predictive analytics, expanded serving capacity, and increased fan engagement



Potentially different storage solutions for racing videos and predictive analytics

Google Cloud

Business requirements

HRL's owners want to expand their predictive capabilities and reduce latency for their viewers in emerging markets. Their requirements are:

- Support ability to expose the predictive models to partners. Increase predictive capabilities during and before races:
  - Race results
  - Mechanical failures
  - Crowd sentiment
- Increase telemetry and create additional insights.
- Measure fan engagement with new predictions.
- Enhance global availability and quality of the broadcasts.
- Increase the number of concurrent viewers.
- Minimize operational complexity.
- Ensure compliance with regulations.
- Create a merchandising revenue stream.

Helicopter Racing League

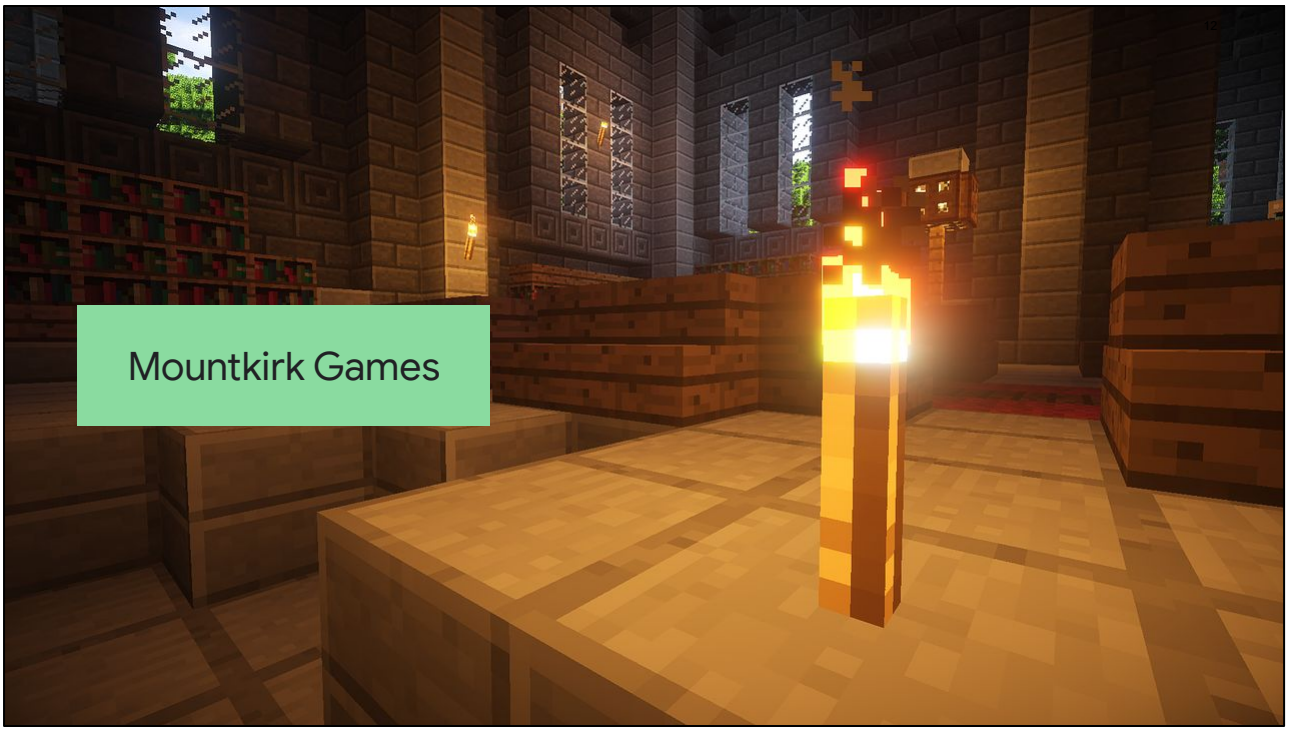
Technical evaluation

Existing Environment	Technical Watchpoints	Proposed Product/Solution
Core of their mission-critical applications runs on their current public cloud provider. Video recording and editing is performed at the race tracks, and the content is encoded and transcoded, where needed, in the cloud.	Compute • Video encoding and transcoding is performed on VMs created for each job. • Race predictions are performed using TensorFlow running on VMs	
Content is stored in an object storage service on their existing public cloud provider.	Storage • Large file object storage (BLOB)	
• Content is stored as BLOBs in an object storage service • Video encoding performed on VMs • Race predictions use TensorFlow on VMs	Data (videos) • Large number of concurrent streaming video viewers • Increased transcoding performance • Ability to create “data mart”	

Google Cloud

Technical requirements

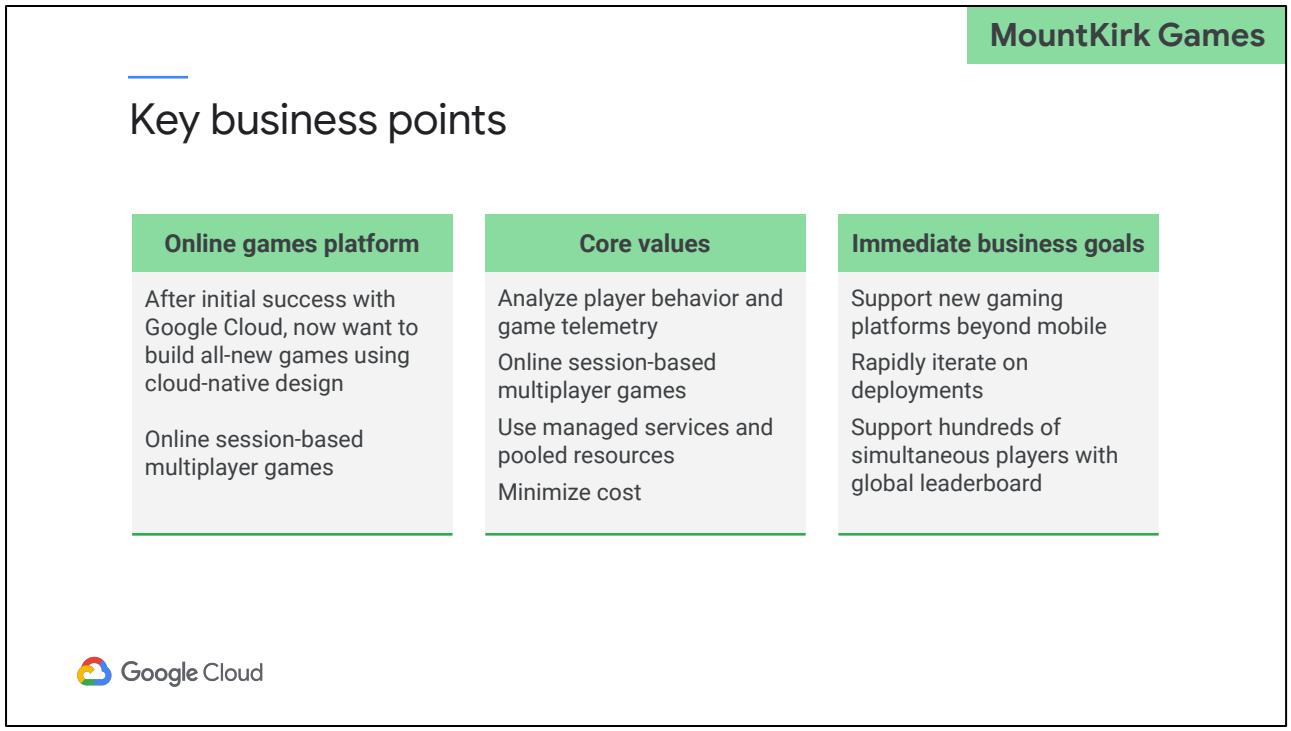
- Maintain or increase prediction throughput and accuracy.
- Reduce viewer latency.
- Increase transcoding performance.
- Create real-time analytics of viewer consumption patterns and engagement.
- Create a data mart to enable processing of large volumes of race data.



https://services.google.com/fh/files/blogs/master_case_study_mountkirk_games.pdf

Company overview
Mountkirk Games makes online, session-based, multiplayer games for mobile platforms. They have recently started expanding to other platforms after successfully migrating their on-premises environments to Google Cloud.

Their most recent endeavor is to create a retro-style first-person shooter (FPS) game that allows hundreds of simultaneous players to join a geo-specific digital arena from multiple platforms and locations. A real-time digital banner will display a global leaderboard of all the top players across every active arena.

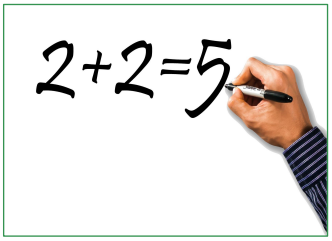


Executive statement

Our last game was the first time we used Google Cloud, and it was a tremendous success. We were able to analyze player behavior and game telemetry in ways that we never could before. This success allowed us to bet on a full migration to the cloud and to start building all-new games using cloud-native design principles. Our new game is our most ambitious to date and will open up doors for us to support more gaming platforms beyond mobile. Latency is our top priority, although cost management is the next most important challenge. As with our first cloud-based game, we have grown to expect the cloud to enable advanced analytics capabilities so we can rapidly iterate on our deployments of bug fixes and new functionality.

MountKirk Games

Key business assumptions



Support multiple platforms across multiple regions

Need dynamic scaling to minimize latency and to minimize cost

Potentially different storage solutions for game itself and analytics

Google Cloud

Business requirements

- Support multiple gaming platforms.
- Support multiple regions.
- Support rapid iteration of game features.
- Minimize latency.
- Optimize for dynamic scaling.
- Use managed services and pooled resources.
- Minimize costs.

MountKirk Games

Technical evaluation

Existing Environment	Technical Watchpoints	Proposed Product/Solution
Existing games migrated to Google Cloud using lift-and-shift VM migrations	Compute • New game backend to be Google Kubernetes Engine • Need to scale across regions • Use GPU processing to render graphics for multi-platform • Eventual migration of existing games to new platform	
Separate environments for development and testing	Storage • New game to using a multi-region Spanner cluster for global leaderboard	
	Data ingestion • Live metrics from game server • Game logs stored in structured files for future analysis	

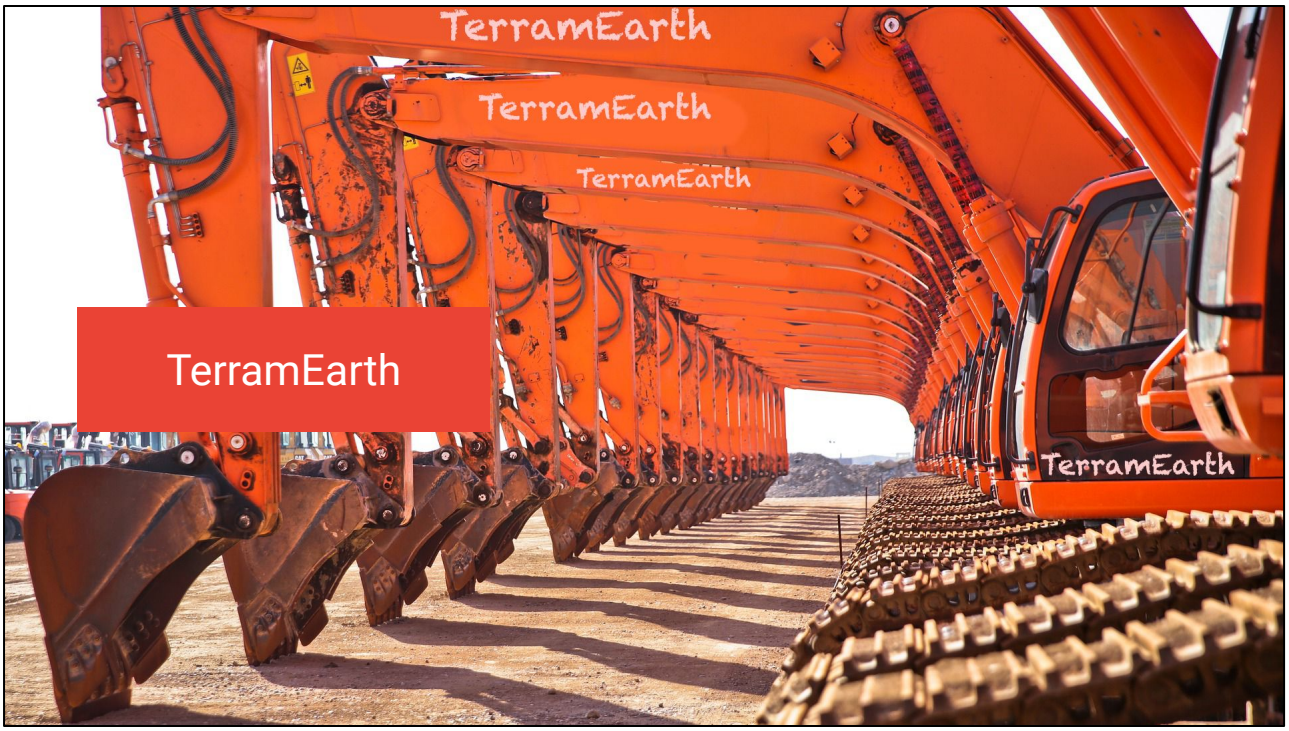
Google Cloud

Mountkirk Games is building a new multiplayer game that they expect to be very popular. They plan to deploy the game's backend on Google Kubernetes Engine so they can scale rapidly and use Google's global load balancer to route players to the closest regional game arenas. In order to keep the global leader board in sync, they plan to use a multi-region Spanner cluster.

The existing environment was recently migrated to Google Cloud, and five games came across using lift-and-shift virtual machine migrations, with a few minor exceptions.
Each new game exists in an isolated Google Cloud project nested below a folder that maintains most of the permissions and network policies. Legacy games with low traffic have been consolidated into a single project. There are also separate environments for development and testing.

Technical requirements

- Dynamically scale based on game activity.
- Publish scoring data on a near real–time global leaderboard.
- Store game activity logs in structured files for future analysis.
- Use GPU processing to render graphics server-side for multi-platform support.
- Support eventual migration of legacy games to this new platform.



TerramEarth manufactures heavy equipment for the mining and agricultural industries. They currently have over 500 dealers and service centers in 100 countries. Their mission is to build products that make their customers more productive.

https://services.google.com/fh/files/blogs/master_case_study_terramearth.pdf

https://pixabay.com/en/industry-heavy-equipment-machine-3286042/

TerramEarth

Key business points

Family-owned business	Core values	Immediate business goals
500 dealers, service centers in 100 countries. 20% yearly growth	Excellent customer service Minimize vehicle downtime	Provide best-in-class online fleet management services to our customers Improve operations of our dealerships and enable access to data Predict and detect vehicle malfunction

Google Cloud

Executive statement

Our competitive advantage has always been our focus on the customer, with our ability to provide excellent customer service and minimize vehicle downtimes. After moving multiple systems into Google Cloud, we are seeking new ways to provide best-in-class online fleet management services to our customers and improve operations of our dealerships. Our 5-year strategic plan is to create a partner ecosystem of new products by enabling access to our data, increasing autonomous operation capabilities of our vehicles, and creating a path to move the remaining legacy systems to the cloud.

Business requirements

- Predict and detect vehicle malfunction and rapidly ship parts to dealerships for just-in- time repair where possible.
- Decrease cloud operational costs and adapt to seasonality.
- Increase speed and reliability of development workflow.
- Allow remote developers to be productive without compromising code or data security.
- Create a flexible and scalable platform for developers to create custom API services for dealers and partners.

TerramEarth

Vehicles

2 million vehicles

- Telemetry data collected from sensors in the vehicle
  - Small subset is transmitted in real time for fleet management
  - Remaining sensor data is uploaded daily when vehicles return to home base
- Each vehicle generates 200 to 500 MB of data per day
- 20% annual growth in number of vehicles

Google Cloud

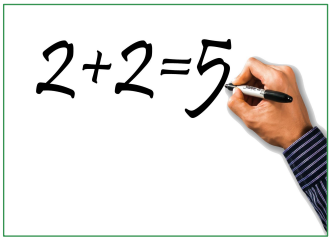
https://pixabay.com/en/combine-harvester-harvest-harvester-1562988/

Solution concept

There are 2 million TerramEarth vehicles in operation currently, and we see 20% yearly growth. Vehicles collect telemetry data from many sensors during operation. A small subset of critical data is transmitted from the vehicles in real time to facilitate fleet management. The rest of the sensor data is collected, compressed, and uploaded daily when the vehicles return to home base. Each vehicle usually generates 200 to 500 megabytes of data per day.

TerramEarth

Key business assumptions



Predict/detect vehicle malfunction and rapidly ship parts for just-in-time repair

Create a platform for developers to create services for dealers and partners - without compromising security

Decrease cloud operational costs;
Increase speed and reliability of development

Google Cloud

Business requirements

- Predict and detect vehicle malfunction and rapidly ship parts to dealerships for just-in-time repair where possible.
- Decrease cloud operational costs and adapt to seasonality.
- Increase speed and reliability of development workflow.
- Allow remote developers to be productive without compromising code or data security.
- Create a flexible and scalable platform for developers to create custom API services for dealers and partners.

TerramEarth

Technical evaluation

Existing Environment	Technical Watchpoints	Proposed Product/Solution
• Multiple systems run in Google Cloud; some legacy systems still • Web frontend for dealers and customers is in Google Cloud and allows access to stock management and analytics	Applications • Container-based workloads • Highly scalable • Cloud-native solutions for keys and secrets management • Identity-based access	
Vehicles • 2 million vehicles x 200 to 500 MB/day	Migration and Partner Access • Create abstraction layer for HTTP API	
Manufacturing • Sensor data is captured from two plants and sent to private data centers ○ legacy inventory and logistics systems ○ Private data centers have network interconnects to Google Cloud	Development • Modernize CI/CD pipelines • Create self-service portal for project and resource mgmt • Manage API endpoints	

Google Cloud

Existing technical environment

TerramEarth's vehicle data aggregation and analysis infrastructure resides in Google Cloud and serves clients from all around the world. A growing amount of sensor data is captured from their two main manufacturing plants and sent to private data centers that contain their legacy inventory and logistics management systems. The private data centers have multiple network interconnects configured to Google Cloud.
The web frontend for dealers and customers is running in Google Cloud and allows access to stock management and analytics.

Technical requirements

- Create a new abstraction layer for HTTP API access to their legacy systems to enable a gradual move into the cloud without disrupting operations.
- Modernize all CI/CD pipelines to allow developers to deploy container-based workloads in highly scalable environments.
- Allow developers to run experiments without compromising security and governance requirements
- Create a self-service portal for internal and partner developers to create new projects, request resources for data analytics jobs, and centrally manage access to the API endpoints.
- Use cloud-native solutions for keys and secrets management and optimize for identity-based access.
- Improve and standardize tools necessary for application and network monitoring and troubleshooting.


Google Cloud