



Reference architecture for Google Cloud and commercetools

Executive Summary

In today's digital and tech-driven environment, it is essential to think about your business and the associated digital infrastructure that plays a role in letting you thrive. Digital transformation is advancing steadily across many countries, organizations, and institutions. Inversely, monolithic platforms and architectures have become increasingly obsolete for being unfit to serve the growing business needs of today. However, some organizations still harbor uncertainty when it comes to parting with old but tested systems in favor of investing in new solutions that have the potential to serve their needs much better – but that they are unfamiliar with. It is, after all, a bold step for organizations that are not already on the leading edge of tech. For them, it is essential to find a solution that prepares a company for the future, and it should be flexible, state-of-the-art, open, and easy to adapt.

commercetools has been providing its customers with the building blocks for the new digital commerce age for several years now with its real cloud-native commerce platform. But even beyond eCommerce, the services provided are being used now, as examples from the automotive industry show.

By choosing the Google Cloud Platform, commercetools' developers can focus on developing new features, allowing customers to create eCommerce solutions that meet their specific needs. The Google Cloud Platform provides developers with all the tools they need to build a high-quality product. It doesn't matter if you use a particular cloud for your project and product, but commercetools and Google strongly recommend Google Cloud Platform (GCP) with its CI/CD tools, API management capabilities, frontends, extensions, etc.

In this white paper, we would like to explain why GCP and commercetools are the best match.

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Introduction

Digital transformation is advancing relentlessly. Anyone who has not yet considered it necessary to think about changes to their digital infrastructure will do so at the latest when they realize that the competition is light years ahead of them or that pandemics can reveal how weak or outdated their own IT landscape is within a short time.

This is especially true in the world of digital commerce. That is why Google – with the Google Cloud Platform (GCP) and commercetools have joined forces to create a robust package with their best-of-breed solutions that facilitate digital transformation and provide organizations with a flexible, secure, scalable, and reliable infrastructure and architecture.

In the following, we would like to take a brief look at commercetools and highlight the advantages of the Google Cloud Platform and why this combination is so powerful.



commercetools and GCP:

Microservices and the demands of retail

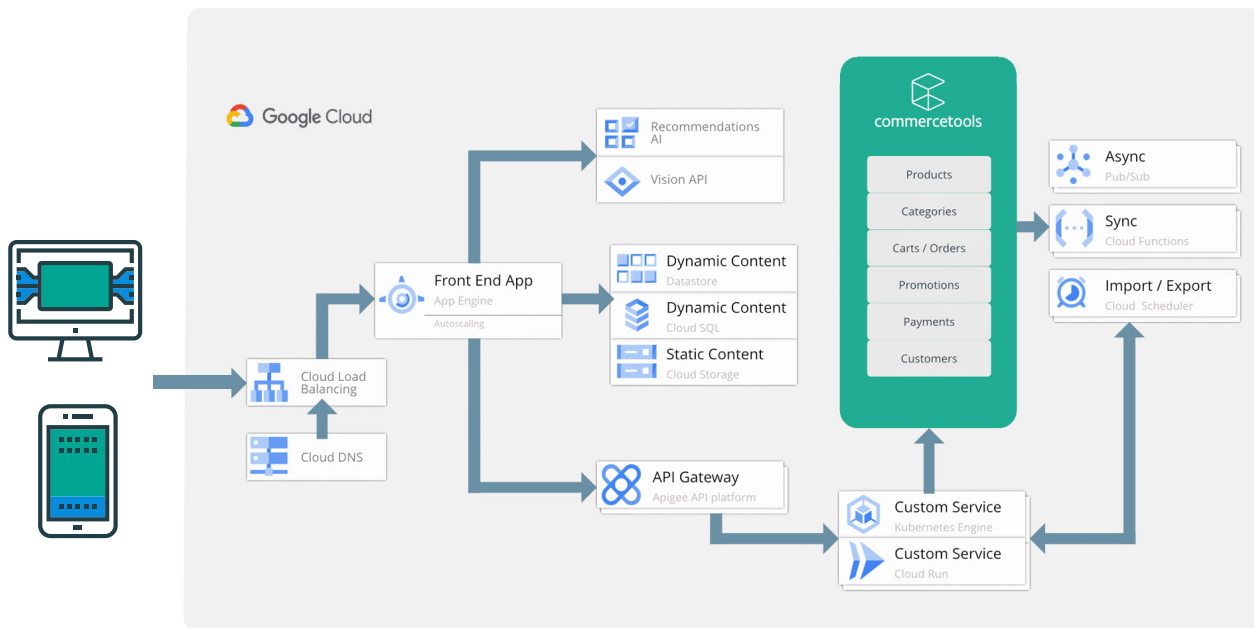
Retail workloads require a range of cloud-native capabilities to meet the demands of an ever-growing number of endpoints and platforms:

- Typically, they must be multi-regional deployments to serve customers worldwide.
- They must support some level of auto-scaling or planned scaling. Thus, temporary peak demand can be met by scaling up, and infrastructure costs can be reduced by scaling down during periods of lower demand.
- Retail deployments must be able to make features and functionality available to customers quickly and efficiently to meet changing market demands.
- Retail deployments should also take advantage of managed infrastructure to allow their respective developers to focus on customer-facing functionality.
- These deployments need to be centrally secured and managed.

commercetools and GCP are well suited to meet these requirements with both solutions. commercetools is a visionary headless commerce platform; a perfect fit for modern, microservices-based architectures. commercetools provides over 300 API endpoints that enable you to build out powerful, customized services for your customers in all frontends and applications, no proprietary skills needed. commercetools is born in the GCP cloud, so you can rest assured that commercetools fully leverages the latest cloud technologies and philosophies.

And by leveraging GCP, microservices can be deployed and scaled independently. This allows you to deploy new functionality rapidly. Services can be small, modular, loosely coupled, and organized according to your organization's specific business functions and requirements. Microservices can leverage service discovery and simple mechanisms (e.g., HTTP) for easy connectivity from various devices.





Backend architecture

In terms of retail workloads, you need microservices that you assign to discrete functions that need to be fulfilled to create the desired user experience. You might have a product metadata service that retrieves metadata for a particular product (and optionally caches it). Or, think about a product pricing service that retrieves the price of a product for a specific client.

Your clients can access the microservices via REST APIs; in turn, your client applications communicate with the REST APIs via an API gateway from GCP.

Frontend architecture

In retail, the customer-facing portion of the workload typically involves responsive web apps, often deployed as progressive web apps and, optionally, as native mobile apps. You need to build these apps in conjunction with the backend architecture shown earlier. You do this by assembling multiple frontend components that correspond to and can communicate with the backend APIs and services. This is where you can rely on commercetools and GCP to provide the best possible customer experience with their unique concepts and features.

Frontends

One of the most important aspects of any commercetools implementation would be the frontend. commercetools supports virtually any type of application and frontend technology out of the box.

And, in terms of frontends, the Google Cloud Platform offers numerous support options. These include the [Cloud CDN](#) (content delivery network), [Google Kubernetes Engine](#) (GKE), [Cloud Run](#), and [Firebase](#).

Cloud CDN

Cloud CDN leverages Google's global edge network to bring content closer to users. This significantly speeds up websites and applications. This is because Cloud CDN uses external HTTP(S) load balancing. Here, the external HTTP(S) load balancer provides the frontend IP addresses and ports that receive requests and the backends that respond to requests.

Google Kubernetes Engine

Google Kubernetes Engine (GKE) consists of multiple machines that together form a cluster. GKE is based on the open-source Kubernetes cluster management system, which itself was heavily influenced by [Google's Borg](#) system. If one chooses to use a GKE Cluster, one benefits from Google Cloud's advanced cluster management features. These include:

- Logging and monitoring
- Load balancing
- Autoscaling
- Automatic node repair
- Automatic upgrades
- Additional flexibility through node pools

GKE's control planes are each automatically upgraded to the latest stable versions of Kubernetes.

Cloud Run

Cloud Run is a managed computing platform that can run stateless containers invoked via pub-/sub- events or web requests. Cloud Run operates serverless and allows one to develop and deploy highly scalable and container-based applications on a fully managed serverless platform. With Cloud Run, developers can write code in their preferred languages, such as Python, JAVA, Ruby, or Node.js. Furthermore, Cloud Run does away with infrastructure management to simplify development accordingly. Besides, Cloud Run is based on the open standard Knative and therefore allows porting of own applications. Important features of Cloud Run are:

- Use of container workflows and standards.
- Arbitrary languages, libraries, and binaries
- Support for WebSockets, HTTP/2, and gRPC
- Usage-based billing

Continuous Deployment for Cloud Run

Deploying code to production – directly from your development machine – can lead to unforeseen problems: The code might have local changes, the process is manual and error-prone, and tests can be bypassed. And later, it's impossible to understand what code is running in production. A best practice to avoid these difficulties is continuously deploying your code as changes are pushed to a branch of your source repository.

With Cloud Run, you can now set up continuous deployment with just a few clicks: From the Cloud Run UI, you can now easily connect to your Git repository and set up continuous deployment to automatically build and deploy your code to your Cloud Run and Cloud Run or Anthos services. This feature is available for both new and existing services.

You can select any repository that contains a Docker file or code written in Go, Node.js, Java, Python, and .NET. Under the hood, the continuous deployment setup process configures a cloud build trigger that builds the code into a container using Docker or Google Cloud Buildpacks, pushes it to [Google Container Registry](#), and deploys it to your Cloud Run service. You can customize this later by adding steps to the Cloud Build Trigger configuration, such as unit or integration testing before deployment.



By default, your code is automatically built and deployed to a new Cloud Run revision. You can still decide whether or not it should receive 100% of the incoming traffic immediately and migrate traffic incrementally later using the newly added traffic controls

Firebase

With Firebase, GCP provides a mobile development platform to build and extend apps quickly. Firebase adds SDKs, tools, and configurations to the Google Cloud Platform. If one plans to write a brand new app or rewrite an existing one from scratch, Firebase is an excellent choice. Additionally, Firebase helps in easy storage and retrieval of dynamic content by providing services like application hosting, firebase datastore and firebase realtime database. Overall, Firebase helps one reduce the development time and lowers the management overhead. Additionally, Firebase Authentication provides backend services, easy-to-use SDKs, and ready-made UI libraries to authenticate users to your app. It supports authentication using passwords, phone numbers, popular federated identity providers like Google, Facebook and Twitter, and more.

Cloud Composer

Workflows are often a topic when it comes to data analytics - they involve ingesting, transforming, and analyzing data, figuring out what information is included that makes sense. In Google Cloud, Cloud Composer is used to host workflows. This is a hosted version of the popular open-source workflow tool Apache Airflow.

Cloud Composer is a fully managed workflow orchestration. You do not have to worry about provisioning resources, you can create, schedule, and monitor workflows at your leisure. Users can fully orchestrate their pipeline thanks to end-to-end integration with Google Cloud products, including BigQuery, Dataflow, Dataproc, Datastore, Cloud Storage, Pub/Sub and AI Platform. Furthermore, it Cloud Composer supports hybrid and multi-cloud architectures, so you can create, schedule, and monitor your workflows from a single orchestration tool. In doing so, your pipeline can exist on-premises, in multiple clouds, or entirely within Google Cloud.



Important features are:

- Build, schedule, and monitor pipelines that span hybrid and multi-cloud environments.
- Based on the open-source Apache Airflow project and run in the Python programming language
- User-friendly and no vendor lock-in

Extensions/Customizations

While the frontend is crucial for building the customer experience, extensions and customizations are crucial to ensure that commercetools integrates seamlessly with your existing business applications and processes.

These extensions and customizations can be made very quickly and efficiently using [Cloud Functions](#) and [Pub/Sub](#).

Cloud Functions

Cloud Functions is an event-driven, serverless computing platform that automatically scales based on load. And you're only billed as long as the code is running. So when your function is idle, the cost is zero. It's easy to set up and link to commercetools: Just write your logic in one of the supporting languages and register it on commercetools. After that, your extension will be directly invoked via HTTP requests.

Trigger functions and processes with file uploads to cloud storage, PubSub events, or Firebase changes are supported. It provides built-in security at the role and per-function levels. You can also monitor and diagnose your applications with operations tools. Cloud Functions acts here as a building block. You can create real-time data processing apps, such as bringing in IoT device data for analysis, calling machine learning APIs to extract information and images, text, or video as soon as the file is uploaded to cloud storage. Creating conversational experiences with Dialogflow, and even building serverless backends with Firebase and third-party apps is supported by Cloud Functions. Cloud Functions also lends itself to an event-driven app.



Pub/Sub

If you want to ingest large amounts of data for analysis or simplify the development of event-driven microservices, then you should look at Cloud Pub/Sub (Publisher/Subscriber). Pub/Sub helps build robust, scalable systems of applications by integrating them asynchronously. Cloud Pub/Sub is a fully managed, real-time messaging service that allows you to send and receive messages between independent applications.

By subscribing to events in commercetools, commercetools will publish all of these as a message, directly in Cloud Pub/Sub. It is the service's job to ensure that all systems that need to respond to that event receive it. The idea behind asynchronous integrations is to respond to events that are presented as messages. Pub/Sub is more scalable than other messaging systems and reduces dependencies because services can change, and those changes don't need to be known to every service. Services subscribe to Pub/Sub to receive the right messages. Therefore, it is also much easier to add new services. The architecture with Cloud Pub/Sub has a built-in failover. If a service goes down, Pub/Sub stores the messages for seven days or until the service is back up and running and then delivers them. Cloud Pub/Sub is a fully managed service.

API Management

Anyone publishing or using APIs would benefit from installing an API management solution. This gives organizations the ability to monitor the interface's lifecycle and ensure that the requirements of the developers and the applications that use the API are met.

API management is consequently the process of developing an API, monitoring, maintaining and releasing it.

Typically, there are several different APIs that are called by frontends that are used. First and foremost, the commercetools API should be mentioned. This is supplemented by own and project-specific APIs, the so-called custom APIs. Finally, the 3rd party APIs should not be forgotten. These are provided by the provider of the search engines, content management tools, etc., used.

API Gateway

Many of these APIs can be called naked APIs, which is about the visibility of APIs. How much do you know about your APIs, their traffic, and their usefulness? Often this involves trawling through web server logs to



understand how the API is being used as a product. However, this can become increasingly complex and difficult.

Often APIs start as an experiment or even so-called “naked functions.” Here, we can also derive the terminology from Naked Object Pattern.

Be that as it may, it is recommended to let an API gateway call these APIs. The advantages here are obvious. An API gateway not only routes the client requests, but it is also a central interface to connect the client with services. It can handle critical security and administration tasks:

- Authentication
- Input validation
- Metrics collection
- Response transformation

Authentication

Authentication of API calls can be done through an API gateway. To do this, even if the client needs to access data from multiple services, it only needs to authenticate once to the gateway. This reduces latency and guarantees that authentication processes are handled consistently throughout the application.

Input validation

An API gateway can also perform simple logic. In the case of an input validation, this means ensuring that the client’s request contains all the necessary information to complete the request in the correct and required format. This must be guaranteed before the request even reaches the service retrieving the data.

Collection of metrics

All requests are routed through the gateway, making it ideal for collecting analytics. An API gateway can measure how many requests are made by a user or how many are routed to a particular microservice. For example, if a user sends too many requests, a gateway can reject them instead of forwarding them to a service.

Response transformation

It is often the case that different devices and users need access to different types of information. Mobile devices, for example, require less data than desktop devices. On the other hand, internal clients may again need more data and information than external clients, for example. Furthermore, an API gateway can help by presenting each client type with its own API. A prominent example of this is the Netflix API gateway.



Google Cloud Platform

Google offers the appropriate solution here with [Apigee](#), which is perfect for use with commercetools. The platform makes it possible to link applications and data and thus create added value for the organization. According to the Gartner Magic Quadrant, Google is here with Apigee, one of the leading providers for API management platforms, also called Apigee Edge. Apigee can be used to create and manage users, organizations, products, and APIs. Apigee Edge can be operated in the cloud or locally on-premise in your own data center. Apigee offers functions such as API management, monetization, and analytics. Monetization can be used to create individual payment plans for the use of APIs.

API Development

Apigee offers numerous tools for API development. In addition to the *Apigee Proxy Cookbook* and the *Community Forum* – which has a dedicated section for design patterns – there is the *Apigee Edge Management UI*.

The management UI provides several ways to create APIs. These include:

- SOAP Service - Connection based on WSDL
- Proxy Bundle – Import of existing proxies from ZIP
- Reverse Proxy - Connection to HTTP backend (JSON or XML)
- js APP - Connection to Node.js app
- No Target - Proxy without backend target

To configure proxies, Apigee provides various policies. These include but are not limited to:

- Extension - Custom code extensions
- Security - Security configurations on API proxies
- Traffic Management - message volume control
- Mediation - Message transformation between provider and consumer



Analytic Tools

A dashboard in the Apigee platform helps one analyze various metrics and information. The API Dashboard provides general information about API Products and Proxies and can be checked using the following parameters:

- Error Code Analysis
- Cache Performance
- API Performance
- Target Performance

There is also a Developer Dashboard where consumers and developers can register and manage their applications, as well as order API products.

Other dashboards can be used for reporting purposes, among other things.

Operation

Apigee can currently be operated in three variants:

- **Public Cloud** - Here, the hosting takes place at Apigee. There are some restrictions, such as a limit on the number of user-defined attributes.
- **Private Cloud** - The functionalities are almost identical to the Public Cloud, except that the limitations are lifted here.
- **On-Premise** - The Apigee platform can be operated and maintained entirely in-house. The prerequisite is that the deployed machines use the CentOS operating system.

Advantages of Apigee

Apigee offers the following advantages:

- Extensibility - With standard JAVA, Python, and JavaScript
- Extensibility policies - Including JAVA callout policy, JavaScript policy, Python script policy, service callout policy, message proc collation policy, and statistics collector policy
- Hosting and running unmodified Node.js applications - Possible without introducing another tool into the environment, comes standard with Apigee Edge



- Extensible via open-source - Code access in a connector and thus possibility to make changes or add additional connectors from open-source sources

Apigee Edge's three components – API services, developer services, and analytics services – address the entire digital value chain. They go far beyond the core functionalities of API gateways. The Apigee platform provides operational metrics, API design, API modeling, and advanced security to make APIs enterprise-ready.

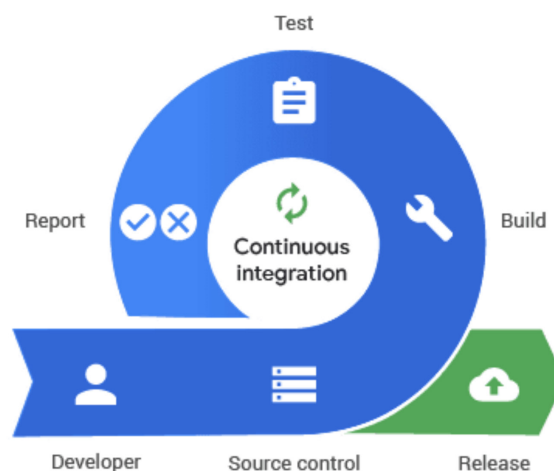
We strongly recommend using commercetools in conjunction with Apigee. It provides the required functionality and guarantees a secure, maintainable, and extensible system.

CI/CD Tools

When it comes to software development, the key to accelerating all involved processes lies in Continuous Integration (CI) and Continuous Delivery (CD).

Continuous Integration (CI)

GCP provides tools for Continuous Integration that can be used to create automated builds, run tests, deploy environments, and check artifacts for security vulnerabilities. All this is possible with GCP within a few minutes.

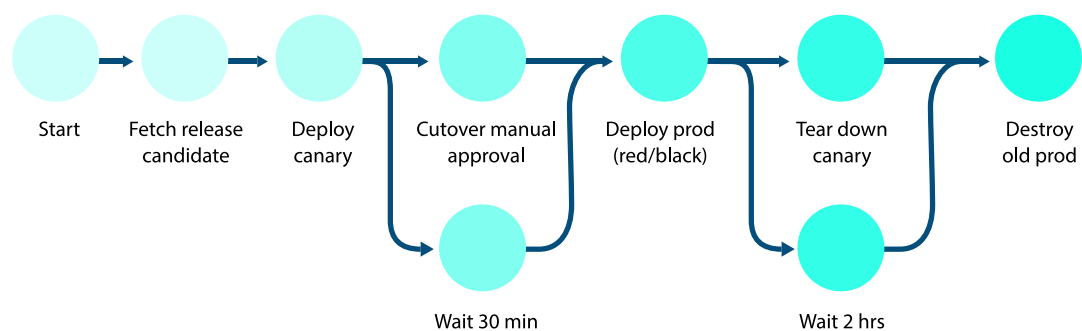


GCP for Continuous Integration has some non-negligible benefits:

- Improve developer efficiency and productivity
- Integrate security and compliance into the CI pipeline
- Combine CI with CD
- Scale easily
- Maximum flexibility
- Work with preferred tools

Continuous Delivery (CD)

With GCP, it is possible to set up continuous delivery pipelines in the shortest possible time, during all phases of software development. Multi-cloud, hybrid and on-premises environments can be covered with this.



GCP for Continuous Delivery has some non-negligible advantages:

- Run in hybrid or multi-cloud environments
- Deliver faster
- Improve quality
- Scale easily
- Deploy securely and quickly

Cloud Build

Forrester lists Cloud Build as a leader in cloud-native continuous integration. Cloud Build is a service that runs your builds on Google Cloud Platform infrastructure.

Cloud Build allows you to import source code from various repositories or cloud locations, run a build to your own specifications, and create Docker containers or JAVA archives..

Cloud Build is an entirely serverless CI/CD platform for building, testing, and deploying software. With Cloud Build, you can:

- Quickly build software in any programming language (e.g., JAVA or Node.js)
- Design custom workflows yourself
- Deploy builds in different environments such as VMs, serverless systems, Kubernetes, or Firebase
- Run extensive security scans as part of the CI/CD pipeline
- Package source code into containers or non-container artifacts using tools like Maven or Gradle

Cloud Source Repositories

Another tool that the Google Cloud Platform provides, and is also a reason why GCP and commercetools are such a great fit, is the Cloud Source Repository. This provides the central place within GCP to store code, manage it, and also track it. However, the Cloud Source Repository is much more than just a private Git repository. It is scalable and offers the full Git repository feature set. The Git workflow can be extended via other Google Cloud tools such as Cloud Build, App Engine, Pub/Sub, and IT Operations Management products such as Cloud Monitoring and Cloud Logging. Google's Operations-Suite (formerly known as Stackdriver) supports monitoring, troubleshooting, and improve application performance in your Google Cloud environment. Important features are:

- Capture metrics, logs, and traces in Google Cloud and your apps.
- Monitor the platform and applications with built-in, out-of-the-box dashboards and views
- Search and analyze these indicators
- Set appropriate performance and availability indicators
- Set up notifications and notification rules with existing systems

Cloud Source Repository provides an unlimited and free number of private Git repositories. Within minutes, changes can be deployed directly from branches or tags to a repository in App Engine. Cloud Build can automatically build and test an image when changes are pushed to the Cloud Source repository. Additionally, Cloud Source repositories provide:



- Version management and aliasing for serverless requests
- Debugging in the production environment
- Detailed audit logs
- Creation of custom integrations with Google Cloud tools

Container Registry

With container registry Docker-Container-Images can be stored, managed, and secured. But Container Registry is much more than just a private Docker-Repository. Container Registry is a central place where your team can manage Docker images, analyze security, and make detailed decisions about who gets access to what. With the integration of existing CI/CD structures, you can set up fully automated Docker pipelines to get feedback quickly.

A secure, private Docker image store on Google Cloud Platform is available in minutes. It gives control over who can access, view, or download the images remains entirely yours. The infrastructure is protected by Google security measures and is available end-to-end. When you commit code to cloud source repositories, GitHub, or Bitbucket, you can automatically build images and commit them to a private registry. With integration with Cloud Build, easily set up CI/CD pipelines or deploy your images directly to Google Kubernetes Engine, App Engine, Cloud Functions, or Firebase. You can identify security vulnerabilities early in the software development process. This way, you ensure a secure deployment of your container images. A continuously updated database helps ensure that vulnerability scanning is always up to date and includes the latest malware. Native integrations with binary authorization to set policies and prevent deployment of images that do not comply with those policies can be used. Questionable container images are automatically locked down to prevent deployment on Google Kubernetes Engine.

You can define multiple registries depending on your requirements and upload and download Docker images to and from your private container registry using the normal Docker command line. Docker lets you easily search for images using names or tags. Scan your Docker containers for security vulnerabilities. Identify security vulnerabilities in packages for Linux distributions.

Connect the Container Registry Vulnerability Scanning API to your existing tools like Black Duck, Twistlock and Aqua. This makes it even easier to identify security vulnerabilities and allows you to fix potential flaws throughout the CI/CD pipeline.



Integrating Continuous Delivery tools

If you use containers, you need a storage location for them. Your development team can benefit from using a continuous delivery system that works with containers. This way, you can periodically build, test, and deploy builds as part of a pipeline when changes have been made to your codebase. Container Registry works with several popular continuous delivery systems, such as:

- Cloud Build
- Artifact Registry
- CircleCI
- Codefresh
- Codeship
- Jenkins
- ...

Artifact Management

The last point from the CI/CD area we want to go into here is artifact management. Artifacts include packages, containers, configuration files, or documents created by software development processes. Examples are:

- Configuration files (e.g. a helmet diagram)
- The output of a build (e.g. container images or software packages)
- Dependencies needed to build or deploy an application (e.g. base images or open-source package)

Working with artifacts can be quite complicated, as they come from many different sources inside and outside an organization. Consequently, each connected system with which one interacts, represents a failure point if they fail or cause others' problems. GCP artifact management resolves these complexity and reliability issues by centralizing artifacts in a single location. Therefore, one gets more control over artifacts and their usage.



Retail-Specific AI

Google Cloud Platform offers intelligent solutions for retail companies that help transform organizations, improve customer experiences, and are great complements to commercetools functionalities. Of particular note is Recommendations AI, which helps implement highly personalized product recommendations at scale. Recommendations AI leverages years of experience from Google Ads, Google Search, and YouTube into a machine learning experience to provide personalized recommendations at all touchpoints. Recommendations AI is a fully managed service that eliminates tasks such as pre-processing data, training and adjusting ML models, load balancing, and manually provisioning infrastructure to handle unexpected traffic spikes. All of this is done automatically. Other benefits include:

- Quick and easy setup
- Outstanding AI from one of the leaders in the field
- Availability at all touchpoints
- Automatic global scaling
- GDPR/DSGVO compliant

Google Cloud Platform gives developers, data scientists, and data engineers products to quickly and cost-effectively turn ideas into reality. These include an AI platform for building, deploying, and managing machine learning models. Pre-built building blocks help add machine vision, voice input/output, conversation, and structured data capabilities to your own applications with little effort. For example, one could search for products in an eCommerce store by uploading images there.

GCP's AI infrastructure supports training Deep Learning and ML models. Besides, Cloud AutoML products can train custom machine learning models with minimal effort, expertise, or prior knowledge.

Contact Center AI

Contact center AI can provide exceptional customer service and increase operational efficiency with artificial intelligence. Virtual agents can have a natural conversation with customers, and expertly assist human agents with complex cases.

Act with Dialogflow - Identify customer intent and determine what to say and do next. Join more than a million developers using Dialogflow, the world-class development suite for creating natural and rich conversational experiences across multiple channels.



Virtual Agent - Provides customers with 24/7 access to instant self-service with seamless handoffs to human agents for more complex issues.

Agent Assist - Enables human agents to provide continuous assistance during their calls and chats by identifying intent and offering step-by-step help in real-time.

Insights - Uses natural language processing to identify call factors and sentiments that help contact center managers learn more about customer interactions to improve call outcomes.

Media Translation

Media Translation adds real-time audio translations to your own content and applications. The Media Translation API delivers spoken language translation directly from your audio data. This audio data will be injected directly into your content and applications in real-time. Using Google's ML technologies, the API provides improved accuracy and simplified integration. At the same time, you get a comprehensive feature set to enhance your translation results further. Offer your users more convenience with low-latency translation streaming. This user-friendly internationalization allows you to reach new audiences quickly.

Online shopping becomes even more personal with Recommendations AI

As digital transformation continues, especially in retail, ensuring a highly personalized shopping experience for online shoppers is critical to customer engagement. In particular, product recommendations are a very effective way helping customers discover products that match their tastes and preferences.

Instead of manually maintaining rules or managing cumbersome recommendation models internally, you can upgrade your personalization strategy by replacing or augmenting your existing solution with Recommendations AI.

By placing a greater focus on each individual customer rather than an item, Recommendations AI can piece together the history of a customer's shopping journey and provide them with personalized product recommendations. Recommendations AI also excels at handling recommendations in scenarios involving long-tail products and cold-start users and items. The "context-aware" deep learning models leverage item and user metadata to gain insights across millions of items and iterate on them in real-time in ways that manually curated rules can't keep up with.

Recommendations AI also provides simplified model management in a scalable managed service with an intuitive user interface. This means your



team no longer has to spend months writing thousands of code lines to train custom recommendation models while struggling to keep up with state of the art.

Google Analytics

With BigQuery, Google provides a serverless, highly scalable and cost-effective multi-cloud data warehouse designed specifically for business agility. Real-time streaming data and up-to-the-minute information on all business operations can be retrieved. Business results can be forecasted on the fly with built-in machine learning, without moving data around. BigQuery can be securely accessed and share analytics data across your organization with just a few clicks. You easily create compelling, out-of-the-box reports and dashboards with popular BI tools. With a 99.99% uptime SLA, BigQuery is highly available and provides robust governance of security, data governance, and reliability. Your data is protected with standard encryption and customer-managed encryption keys.

Another option is Dataflow, a unified serverless, fast and cost-effective processing of streaming and batch data. Dataflow has many useful features, some of those are:

- **Resource autoscaling and dynamic work balancing** - With data-aware resource autoscaling, you can minimize pipeline latency, maximize resource utilization, and reduce processing costs per dataset. Data inputs are automatically partitioned and permanently evenly distributed to balance worker resource usage and reduce the impact of “hot keys” on pipeline performance.
- **Flexible scheduling and pricing for batch processing** - For flexible processing in the context of scheduling jobs, for example overnight, flexible resource scheduling (FlexRS) results in more favorable pricing for batch processing. These flexible jobs are placed in a queue with a guarantee that they will be retrieved and executed within six hours.
- **Real-time, ready-to-run AI patterns** - With ready-to-use patterns, Dataflow's real-time AI capabilities enable real-time responses with near-human intelligence to numerous events. Customers can create intelligent solutions for a wide range of areas, including predictive analytics, anomaly detection, real-time personalization, and other advanced analytics use cases.

Finally, we have Google Analytics for Firebase. At the heart of Firebase is Google Analytics, a free and unlimited analytics solution. Analytics integrates across Firebase features and provides you with unlimited reporting for up to 500 distinct events that you can define using the Firebase SDK. Analytics



reports help you understand clearly how your users behave, which enables you to make informed decisions regarding app marketing and performance optimizations. Key capabilities are:

- Unlimited Reporting - Analytics provides unlimited reporting on up to 500 distinct events.
- Audience Segmentation - Custom audiences can be defined in the Firebase console based on device data, custom events, or user properties. These audiences can be used with other Firebase features when targeting new features or notification messages.



Summary

Wrap Up

Google Cloud Platform brings a wide range of tools and utilities that make working with commercetools easier and form a perfect symbiosis with the commercetools architecture. In this white paper, we have highlighted and clarified why commercetools and GCP are a perfect match. But there are numerous advantages from the software side; the cost side must also be considered here.

Benefits of the Google Cloud Platform

For commercetools customers, the Google Cloud Platform offers numerous advantages. These benefits include, in addition to those mentioned in this document, the following:

- **Possible cost savings**, because compared to the market leader AWS, most services are significantly cheaper – according to its own information, the cloud provider enables a **saving of up to 75%**.
- In terms of **security**, the Google Cloud Platform is a **good choice** anyway, as persistent disks can be **encrypted** according to some specifications such as, SOC 1, SOC 2 and SOC 3, SSAE-16, and ISO 27001.
- Probably the most significant advantage, however, is the **tremendous speed**; as the infrastructure at hand is based on Google's **fiber network**, so connections are faster than any other cloud provider.

Costs of the Google Cloud Platform

When it comes to price, the Google Cloud Platform is a good option, especially for smaller businesses, as billing is done on a 10-minute basis instead of hourly. In general, the prices for most of the offered services are far cheaper than with AWS or even Microsoft Azure. According to its own information, the cloud provider has the lowest list prices. To cite just one example: The web-level Cassandra storage backend costs one-third less on Google Cloud Platform than on AWS. Besides, Google has officially committed to passing on future price reductions associated with technological advances to its customers.

Therefore, we at commercetools recommend Google Cloud Platform (GCP) to complement our eCommerce solution. With GCP, you can create a true MACH (Microservices, API, Cloud-Native, Headless) landscape that gives you the necessary flexibility, the right tools, and future-proofing.



About commercetools

commercetools is the world's leading platform for next-generation B2C and B2B commerce. To break the market out of being restrained by legacy suites, commercetools invented a headless, API-first, multi-tenant SaaS commerce platform that is cloud-native and uses flexible microservices. Using modern development building blocks in a true cloud platform provided by commercetools, customers can deliver the best commerce experiences across every touchpoint on a large scale.

Founded in Germany in 2006, commercetools has worldwide offices spanning the US, Europe and Asia Pacific, with a customer base of Fortune Global 500 companies across industries.

Contact Us

Europe - HQ

commercetools GmbH
Adams-Lehmann-Str. 44
80797 Munich, Germany
Tel. +49 (89) 99 82 996-0
info@commercetools.com

Americas

commercetools, Inc.
324 Blackwell, Suite 120
Durham, NC 27701
Tel. +1 212-220-3809
mail@commercetools.com

www.commercetools.com

Munich - Berlin - Jena - Amsterdam - London - Durham NC - Singapore - Melbourne

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