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The Architecture Center provides content resources across a wide variety of application development subjects.

Application development resources in the Architecture Center

You can filter the following list of application development resources by typing a product name or a phrase that's in the resource title or description.

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Apache Guacamole on GKE and Cloud SQL

Describes an architecture for hosting Apache Guacamole on Google Kubernetes Engine (GKE) and Cloud SQL. Apache Guacamole offers a fully browser-based way to access remote desktops through Remote Desktop Protocol (RDP).

Products used: Cloud SQL, Compute Engine, Google Kubernetes Engine (GKE)

Architecture decision records overview

Explains when and how to use architecture decision records (ADRs) as you build and run applications on Google Cloud.

Products used: Cloud Pub/Sub, Cloud SQL, Google Kubernetes Engine (GKE)

Architecture for MLops using TensorFlow Extended, Vertex AI Pipelines, and Cloud Build

This document describes the overall architecture of a machine learning (ML) system using TensorFlow Extended (TFX) libraries. It also discusses how to set up a continuous integration (CI), continuous delivery (CD), and continuous training (CT) for...

Products used: Cloud Build

Architectures for high availability of MySQL clusters on Compute Engine

Describes several architectures that provide high availability (HA) for MySQL deployments on Google Cloud.

Products used: Compute Engine

Authenticate workforce users in a hybrid environment

How to extend your identity management solution to Google Cloud to enable your workforce to authenticate and consume services in a hybrid computing environment.

Products used: Cloud Identity

Automate malware scanning for files uploaded to Cloud Storage

This document shows you how to build an event-driven pipeline that can help you automate the evaluation of files for malicious code.

Products used: Cloud Logging, Cloud Run, Cloud Storage, Eventarc

Best practices and reference architectures for VPC design

This guide introduces best practices and typical enterprise architectures for the design of virtual private clouds (VPCs) with Google Cloud.

Products used: Cloud DNS, Cloud Interconnect, Cloud NAT, Cloud Router, Cloud VPN, Virtual Private Cloud

Best practices for running cost-optimized Kubernetes applications on GKE

A document describing Google Kubernetes Engine (GKE) features and options, and the best practices for running cost-optimized applications on GKE to take advantage of the elasticity provided by Google Cloud.

Products used: Compute Engine, Google Kubernetes Engine (GKE)

Build a hybrid render farm

Provides guidance on extending your existing, on-premises render farm to use compute resources on Google Cloud (Google Cloud).

Products used: BigQuery, Cloud Interconnect, Cloud Storage, Cloud VPN, Compute Engine, Dedicated Interconnect

Build hybrid and multcloud architectures using Google Cloud

Provides practical guidance on planning and architecting your hybrid and multi-cloud environments using Google Cloud.

Products used: Anthos, Cloud Load Balancing, Compute Engine, Google Kubernetes Engine (GKE)

Building internet connectivity for private VMs

Describes options for connecting to and from the internet using Compute Engine resources that have private IP addresses.

Products used: Cloud Load Balancing, Cloud NAT, Compute Engine, Identity-Aware Proxy

C3 AI architecture on Google Cloud

Develop applications using C3 AI and Google Cloud.

Products used: Cloud Key Management Service, Cloud NAT, Cloud Storage, Virtual Private Cloud

CI/CD pipeline for developing and delivering containerized apps

Describes how to set up and use a development, continuous integration (CI), and continuous delivery (CD) system using an integrated set of Google Cloud tools.

Products used: Artifact Registry, Cloud Build, Cloud Deploy, Google Kubernetes Engine (GKE)

Cloud Monitoring metric export

Describes a way to export Cloud Monitoring metrics for long-term analysis.

Products used: App Engine, BigQuery, Cloud Monitoring, Cloud Pub/Sub, Cloud Scheduler, Datalab, Looker Studio

Connect Google Virtual Private Clouds to Oracle Cloud Infrastructure using Equinix

Shows how to use Equinix Network Edge and Partner Interconnect to deploy multcloud connectivity between Google Cloud VPC networks and Oracle® VCNs.

Products used: Cloud Interconnect, Compute Engine, Virtual Private Cloud

Connected device architectures on Google Cloud

An overview on a series of approaches for connected device IoT architectures on Google Cloud.

Controls to restrict access to individually approved APIs

Many organizations have a compliance requirement to restrict network access to an explicitly approved list of APIs, based on internal requirements or as part of adopting Assured Workloads. On-premises, this requirement is often addressed with proxy...

Products used: assured Workloads

Deploy an Active Directory forest on Compute Engine

Shows you how to deploy an Active Directory forest on Compute Engine in a way that follows the best practices.

Products used: Cloud DNS, Compute Engine, Identity-Aware Proxy

Deploy an enterprise developer platform on Google Cloud

Describes the enterprise application blueprint, which deploys an internal developer platform that provides managed software development and delivery.

Design secure deployment pipelines

Describes best practices for designing secure deployment pipelines based on your confidentiality, integrity, and availability requirements.

Products used: App Engine, Cloud Run, Google Kubernetes Engine (GKE)

DevOps capabilities

A set of capabilities that drive higher software delivery and organizational performance, as identified and validated by the DevOps Research and Assessment (DORA) team.

Disaster recovery planning guide

The first part of a series that discusses disaster recovery (DR) in Google Cloud. This part provides an overview of the DR planning process: what you need to know in order to design and implement a DR plan.

Products used: Cloud Key Management Service, Cloud Storage, Spanner

Distributed load testing using Google Kubernetes Engine

This tutorial explains how to use Google Kubernetes Engine (GKE) to deploy a distributed load testing framework that uses multiple containers to create traffic for a simple REST-based API. This tutorial load-tests a web application deployed to App...

Products used: Google Kubernetes Engine (GKE)

Enterprise application on Compute Engine VMs with Oracle Exadata in Google Cloud

Provides a reference architecture for an application that's hosted on Compute Engine VMs with connectivity to Oracle Cloud Infrastructure (OCI) Exadata databases in Google Cloud.

Products used: Cloud Interconnect, Cloud Load Balancing, Cloud Monitoring, Cloud NAT, Cloud VPN, Compute Engine, Google Cloud Armor, Partner Interconnect, Virtual Private Cloud

Enterprise application with Oracle Database on Compute Engine

Provides a reference architecture to host an application that uses an Oracle database, deployed on Compute Engine VMs.

Products used: Cloud Interconnect, Cloud Load Balancing, Cloud Logging, Cloud Monitoring, Cloud NAT, Cloud Storage, Cloud VPN, Compute Engine, Google Cloud Armor, Google Cloud Hyperdisk, Virtual Private Cloud

File storage on Compute Engine

Describes and compares options for file storage on Compute Engine.

Products used: Compute Engine, Filestore

From edge to mesh: Expose service mesh applications through GKE Gateway

Combines Cloud Service Mesh with Cloud Load Balancing to expose applications in a service mesh to internet clients.

Products used: Cloud Load Balancing, Cloud Service Mesh, Google Kubernetes Engine (GKE)

From edge to multi-cluster mesh: Globally distributed applications exposed through GKE Gateway and Cloud Service Mesh

Describes exposing applications externally through Google Kubernetes Engine (GKE) Gateways running on multiple GKE clusters within a service mesh.

Products used: Certificate Manager, Cloud Endpoints, Cloud Load Balancing, Cloud Service Mesh, Google Cloud Armor, Google Kubernetes Engine (GKE)

GKE Enterprise reference architecture: Google Distributed Cloud (software only) on bare metal

Describes the reference architecture used to deploy Google Distributed Cloud on bare metal and is based on GKE Enterprise architecture foundations and principles.

Products used: Anthos, Compute Engine, Google Kubernetes Engine (GKE)

Google Workspace Backup with Afi.ai

Describes how to set up an automated Google Workspace backup using Afi.ai.

Products used: Cloud Storage

Hub-and-spoke network architecture

Evaluate the architectural options for designing hub-and-spoke network topologies in Google Cloud.

Products used: Cloud NAT, Cloud VPN, Virtual Private Cloud

Hybrid and multcloud architecture patterns

Discusses common hybrid and multcloud architecture patterns, and describes the scenarios that these patterns are best suited for.

Products used: Cloud DNS, Cloud Interconnect, Cloud Pub/Sub, Cloud Run, Cloud SQL, Cloud Storage, Google Cloud Armor, Google Kubernetes Engine (GKE), Looker

Hybrid and multcloud monitoring and logging patterns

Discusses monitoring and logging architectures for hybrid and multcloud deployments, and provides best practices for implementing them by using Google Cloud.

Products used: Anthos, Cloud Logging, Cloud Monitoring, Google Kubernetes Engine (GKE)

Hybrid and multcloud secure networking architecture patterns

Discusses several common secure network architecture patterns that you can use for hybrid and multcloud architectures.

Products used: Cloud DNS, Cloud Interconnect, Cloud NAT, Cloud VPN, Compute Engine, Google Cloud Armor, Google Kubernetes Engine (GKE)

Identify and prioritize security risks with Wiz Security Graph and Google Cloud

Describes how to identify and prioritize security risks in your cloud workloads with Wiz Security Graph and Google Cloud.

Products used: Artifact Registry, Cloud Audit Logs, Cloud SQL, Cloud Storage, Compute Engine, Google Kubernetes Engine (GKE), Identity Access Management, Security Command Center

Infrastructure for a RAG-capable generative AI application using GKE

Shows you how to design the infrastructure for a generative AI application with RAG using GKE.

Products used: Cloud SQL, Cloud Storage, Google Kubernetes Engine (GKE)

Introduction to microservices

This document is the first in a four-part series about designing, building, and deploying microservices.

Products used: Cloud SQL, Cloud Trace, Google Kubernetes Engine (GKE)

Jump Start Solution: Cloud SDK Client Library

Interact with Google Cloud using the Google Cloud SDK Client Libraries to transform and query information.

Jump Start Solution: Dynamic web application with Java

Run a dynamic web application built using Java and deployed on Google Kubernetes Engine (GKE).

Jump Start Solution: Dynamic web application with JavaScript

Run a dynamic web application built using JavaScript and deployed on Cloud Run.

Jump Start Solution: Dynamic web application with Python and JavaScript

Run a dynamic web application built using Python and JavaScript and deployed on Cloud Run.

Jump Start Solution: Ecommerce platform with serverless computing

Run a containerized ecommerce application in a serverless environment using Cloud Run.

Jump Start Solution: Ecommerce web app deployed on Kubernetes

Run a microservices-based ecommerce application deployed on Google Kubernetes Engine (GKE) clusters.

Jump Start Solution: Stateful app with zero downtime deployment on Compute Engine

Use a blue-green deployment pattern to update a live app on Compute Engine VMs with minimal downtime.

Jump Start Solution: Stateful app with zero downtime deployment on GKE

Use a rolling-update deployment pattern to update a live app on Google Kubernetes Engine (GKE) with minimal downtime.

Jump Start Solution: Three-tier web app

Run a three-tier web app in a serverless environment using Cloud Run.

Log and monitor on-premises resources with BindPlane

Describes considerations and design patterns for using Cloud Logging, Cloud Monitoring, and BindPlane to provide logging and monitoring services for on-premises resources.

Products used: Cloud Logging, Cloud Monitoring

Manage and scale networking for Windows applications that run on managed Kubernetes

Discusses how to manage networking for Windows applications that run on Google Kubernetes Engine using Cloud Service Mesh and Envoy gateways.

Products used: Cloud Load Balancing, Cloud Service Mesh, Google Kubernetes Engine (GKE)

Migrate to a Google Cloud VMware Engine platform

Describes the VMware Engine blueprint, which deploys a platform for VM workloads.

Products used: Vmwareengine

Migrate to Google Cloud

Helps you plan, design, and implement the process of migrating your application and infrastructure workloads to Google Cloud, including computing, database, and storage workloads.

Products used: App Engine, Cloud Build, Cloud Data Fusion, Cloud Deployment Manager, Cloud Functions, Cloud Run, Cloud Storage, Container Registry, Data Catalog, Dataflow, Direct Peering, Google Kubernetes Engine (GKE), Transfer Appliance

Migrating On-Premises Hadoop Infrastructure to Google Cloud

Guidance on moving on-premises Hadoop workloads to Google Cloud...

Products used: BigQuery, Cloud Storage, Dataproc

MLops: Continuous delivery and automation pipelines in machine learning

Discusses techniques for implementing and automating continuous integration (CI), continuous delivery (CD), and continuous training (CT) for machine learning (ML) systems.

NetApp Cloud Volumes Service for Google Cloud

Describes the workflow for using NetApp Cloud Volumes Service, a fully managed, cloud-native data storage service that provides advanced data management capabilities and highly scalable performance.

Products used: Compute Engine, Virtual Private Cloud

Onboarding best practices for state, local, and education organizations

Defines onboarding considerations and best practices for creating a Google Cloud and Google Workspace environment for state, local, and education (SLED) organizations, which often have unique IT needs compared to other enterprises.

Products used: Cloud Billing, Google Workspace, Identity and Access Management

Overview of identity and access management

Explores the general practice of identity and access management (generally referred to as IAM) and the individuals who are subject to it, including corporate identities, customer identities, and service identities.

Products used: Cloud Identity, Identity and Access Management

Patterns and practices for identity and access governance on Google Cloud

There are a number of Google Cloud products and services that you can use to help your organization develop an approach for identity governance and access management for applications and workloads running on Google Cloud. This document is intended...

Products used: Cloud Audit Logs, Google Groups, Identity and Access Management

Patterns for automated compliance testing using Chef InSpec

Patterns for automating policy and compliance checks for your Google Cloud resources using Chef InSpec.

Products used: Conffig Sync, Policy Controller, Security Command Center

Patterns for connecting other cloud service providers with Google Cloud

Helps cloud architects and operations professionals decide how to connect Google Cloud with other cloud service providers (CSP) such as Amazon Web Services (AWS) and Microsoft Azure.

Products used: Cloud Interconnect, Dedicated Interconnect, Partner Interconnect

Patterns for scalable and resilient apps

Introduces some patterns and practices for creating apps that are resilient and scalable, two essential goals of many modern architecture exercises.

Products used: Cloud Load Balancing, Cloud Monitoring, Cloud SQL, Cloud Storage, Compute Engine

Patterns for using Active Directory in a hybrid environment

Requirements to consider when you deploy Active Directory to Google Cloud and helps you choose the right architecture.

Products used: Cloud Identity

PCI Data Security Standard compliance

Shows how to implement the Payment Card Industry Data Security Standard (PCI DSS) for your business on Google Cloud.

Products used: App Engine, BigQuery, Cloud Functions, Cloud Key Management Service, Cloud Logging, Cloud Monitoring, Cloud Storage, Compute Engine, Google Kubernetes Engine (GKE), Sensitive Data Protection, VPC Service Controls

PCI DSS compliance on GKE

This guide is intended to help you address concerns unique to Google Kubernetes Engine (GKE) applications when you are implementing customer responsibilities for Payment Card Industry Data Security Standard (PCI DSS) requirements. Disclaimer: This...

Products used: Google Cloud Armor, Google Kubernetes Engine (GKE), Sensitive Data Protection

Reference architecture: Resource management with ServiceNow

Provides architectural recommendations to integrate Google Cloud assets into ServiceNow discovery tools.

Products used: Cloud Asset Inventory, Compute Engine

Scalable BigQuery backup automation

Build a solution to automate recurrent BigQuery backup operations at scale, with two backup methods: BigQuery snapshots and exports to Cloud Storage.

Products used: BigQuery, Cloud Logging, Cloud Pub/Sub, Cloud Run, Cloud Scheduler, Cloud Storage

Security blueprint: PCI on GKE

The PCI on GKE blueprint contains a set of Terraform configurations and scripts that demonstrate how to bootstrap a PCI environment in Google Cloud. The core of this blueprint is the Online Boutique application, where users can browse items, add them...

Products used: analytics Kubernetes Engine (GKE)

Security log analytics in Google Cloud

Shows how to collect, export, and analyze logs from Google Cloud to help you audit usage and detect threats to your data and workloads. Use the included threat detection queries for BigQuery or Chronicle, or bring your own SIEM.

Products used: BigQuery, Cloud Logging, Compute Engine, Looker Studio

Select a managed container runtime environment

Learn about managed runtime environments and assess your requirements to choose between Cloud Run and GKE Autopilot.

Products used: Cloud Run, Google Kubernetes Engine (GKE)

Set up Chrome Remote Desktop for Linux on Compute Engine

Shows you how to set up the Chrome Remote Desktop service on a Debian Linux virtual machine (VM) instance on Compute Engine. Chrome Remote Desktop allows you to remotely access applications with a graphical user interface.

Products used: Compute Engine

Set up Chrome Remote Desktop for Windows on Compute Engine

Shows you how to set up the Chrome Remote Desktop service on a Microsoft Windows virtual machine (VM) instance on Compute Engine. Chrome Remote Desktop allows you to remotely access applications with a graphical user interface.

Products used: Compute Engine

Support your migration with Istio mesh expansion

Describes an architecture that uses an Istio service mesh to migrate from a legacy environment to Google Kubernetes Engine (GKE).

Products used: Google Kubernetes Engine (GKE)

Twelve-factor app development on Google Cloud

This document describes the popular twelve-factor app methodology and how to apply it when you deploy apps that run on Google Cloud. If you use this methodology, you can make scalable and resilient apps that can be continuously developed with maximum...

Products used: App Engine, Cloud Functions, Cloud Source Repositories, Compute Engine, Container Registry, Google Kubernetes Engine (GKE)

Use a CI/CD pipeline for data-processing workflows

Describes how to set up a continuous integration/continuous deployment (CI/CD) pipeline for processing data by implementing CI/CD methods with managed products on Google Cloud.

Products used: Cloud Build, Cloud Composer, Cloud Source Repositories, Cloud Storage, Compute Engine, Dataflow

Use Apache Hive on Dataproc

Shows how to use Apache Hive on Dataproc in an efficient and flexible way by storing Hive data in Cloud Storage and hosting the Hive metastore in a MySQL database on Cloud SQL.

Products used: Cloud SQL, Cloud Storage, Dataproc

Use distributed tracing to observe microservice latency

Shows how to capture trace information on microservice applications using OpenTelemetry and Cloud Trace.

Products used: Cloud Build, Cloud Trace, Compute Engine, Google Kubernetes Engine (GKE)

Website hosting

How to host a website on Google Cloud. Google Cloud provides a robust, flexible, reliable, and scalable platform for serving websites.

Products used: App Engine, Cloud Storage, Compute Engine, Google Kubernetes Engine (GKE)

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