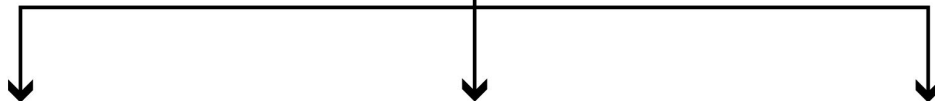# Cloud SQL kao DBaaS

Database-as-a-Service

Google Cloud SQL

Relational Database Engines

| MySQL | PostgreSQL | SQL Server |

Cloud SQL instanca

- Cloud SQL instanca je pojedinačna implementacija baze podataka u okviru Cloud SQL-a.
- Svaka instanca predstavlja zaseban entitet koji sadrži konfiguraciju i resurse potrebne za rad određene baze podataka.
- Cloud SQL instance omogućavaju korisnicima da skladište, upravljaju i pristupaju svojim podacima na efikasan i skalabilan način, bez potrebe za upravljanjem infrastrukturom ili administrativnim zadacima.
- Svaka instanca može biti konfigurisana sa određenim resursima, kao što su veličina memorije i propusnost.
- Instanca može imati jednu ili više baza podataka, u zavisnosti od potreba aplikacije.

gcloud komandna linija

gcloud sql GROUP | COMMAND [GCLOUD_WIDE_FLAG …].

GROUP:

- backup - sadrži naredbe za kreiranje i upravljanje sigurnosnim kopijama
- databases - sadrži komande za upravljanje bazama podataka instanci
- export - sadrži komande za eksportovanje instanci
- flags - sadrži komande za izlistavanje flegova
- import - sadrži komande za importovanje instanci
- instances - sadrži komande za upravljanje instancama
- operations - sadrži komande za rad sa operacijama instanci
- ssl - sadrži komande za upravljanje SSL sertifikatima instanci
- users - sadrži komande za upravljanje korisnicima Cloud SQL-a

gcloud komandna linija

gcloud sql GROUP | COMMAND [GCLOUD_WIDE_FLAG …].

COMMAND:

- Naredbe su specifične operacije koje želite izvršiti unutar određene grupe. Na primer, unutar grupe "backup" možete imati naredbe poput "create", "list", "restore" koje se odnose na različite aspekte sigurnosnih kopija.

1. **Kreiranje Cloud SQL instance:**

   gcloud sql instances create - Ova naredba se koristi za kreiranje nove Cloud SQL instance. Možete specificirati različite parametre kao što su ime instance, regija, verzija baze podataka, veličina memorije i propusnost. Na primer:

   gcloud sql instances create my-instance --database-version=MYSQL_8_0 --tier=db-n1-standard-2 --region=europe-west1

2. **Prikazivanje liste Cloud SQL instanci:**

   gcloud sql instances list - Ova naredba prikazuje listu svih Cloud SQL instanci koje su kreirane u okviru projekta. Možete dodatno filtrirati rezultate i specificirati određene parametre za prikaz. Na primer:

   gcloud sql instances list --project=my-project

3. **Povezivanje sa Cloud SQL instancom:**

   gcloud sql connect - Ova naredba se koristi za povezivanje sa Cloud SQL instancom koristeći interaktivni SQL klijent. Na taj način možemo izvršavati SQL upite direktno na Cloud SQL instanci. Na primer:

   gcloud sql connect my-instance --user=root --quiet

6. **Brisanje Cloud SQL instance:**

   gcloud sql instances delete - Ova naredba se koristi za brisanje Cloud SQL instance. Pre brisanja, potrebno je potvrditi brisanje i specificirati ime instance koju želite izbrisati. Na primer:

   gcloud sql instances delete my-instance --project=my-project --quiet

MySQL u Cloud SQL-u

My First Project

Cloud SQL

Cloud SQL offers a fully-managed database service for MySQL, PostgreSQL, and SQL Server, reducing your overall cost of operations and freeing up teams to focus on innovation

CREATE INSTANCE WITH YOUR FREE CREDITS   ⇄ MIGRATE DATA

Choose your database engine

MySQL

Versions: 8.0, 5.7, 5.6

Choose MySQL

PostgreSQL

Versions: 15, 14, 13, 12, 11, 10, 9.6

Choose PostgreSQL

SQL Server

Versions: 2022, 2019, 2017

Choose SQL Server

Want more context on the Cloud SQL database engines? Learn more ⧉

Customize your instance

You can also customize instance configurations later

∨ SHOW CONFIGURATION OPTIONS

CREATE INSTANCE   CANCEL

CLOUD SHELL
Terminal   (maximal-symbol-391019) ✕   + ▾

✎ Open Editor

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to maximal-symbol-391019.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql instances create mysecondinstance --cpu=1 --memory=4 --region=us-central1
API [sqladmin.googleapis.com] not enabled on project [1082007037427]. Would you like to enable
 and retry (this will take a few minutes)? (y/N)?  y

Enabling service [sqladmin.googleapis.com] on project [1082007037427]...
Operation "operations/acat.p2-1082007037427-2badf581-7d37-4395-a648-17527092f8c0" finished successfully.
Creating Cloud SQL instance for MYSQL_8_0...working...
```

```
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql instances list
NAME: myfirstinstance
DATABASE_VERSION: MYSQL_8_0_33
LOCATION: us-central1-f
TIER: db-custom-4-26624
PRIMARY_ADDRESS: 34.135.107.131
PRIVATE_ADDRESS: -
STATUS: PENDING_CREATE

NAME: mysecondinstance
DATABASE_VERSION: MYSQL_8_0
LOCATION: us-central1-f
TIER: db-custom-1-4096
PRIMARY_ADDRESS: 35.232.228.111
PRIVATE_ADDRESS: -
STATUS: RUNNABLE
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$
```

Prikaz svih instanci

Naredba connect za povezivanje na instancu


```
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql connect myfirstinstance
Allowlisting your IP for incoming connection for 5 minutes...done.
Connecting to database with SQL user [root].Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 101
Server version: 8.0.33-google (Google)

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

Primer osnovnih operacija u MySQL-u

```
mysql> CREATE DATABASE zoo;
Query OK, 1 row affected (0.12 sec)

mysql> USE zoo;
Database changed
mysql> CREATE TABLE animal(species VARCHAR(255), name VARCHAR(255), gender CHAR(1) NOT NULL, e
ntryID INT NOT NULL AUTO_INCREMENT, PRIMARY KEY(entryID));
Query OK, 0 rows affected (0.14 sec)

mysql> INSERT INTO animal (species, name, gender) values ("tiger", "Tommy", "M");
Query OK, 1 row affected (0.11 sec)

mysql> INSERT INTO animal (species, name, gender) values ("elephant", "Anna", "F");
Query OK, 1 row affected (0.11 sec)

mysql> SELECT * FROM animal;
+----------+-------+--------+---------+
| species  | name  | gender | entryID |
+----------+-------+--------+---------+
| tiger    | Tommy | M      |       1 |
| elephant | Anna  | F      |       2 |
+----------+-------+--------+---------+
2 rows in set (0.10 sec)
```

Kreiranje baze podataka pomoću gcloud-a

```
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql databases create hospital --instance=myfirstinstance
Creating Cloud SQL database...done.
Created database [hospital].
instance: myfirstinstance
name: hospital
project: maximal-symbol-391019
```

Sve baze podataka instance myfirstinstance

SQL

PRIMARY INSTANCE

- Overview
- System insights
- Query insights
- Connections
- Users
- **Databases**
- Backups
- Replicas
- Operations

- Release Notes

Databases

All instances > myfirstinstance

✓ **myfirstinstance**

MySQL 8.0

➕ **CREATE DATABASE**

Name ↑	Collation	Character set	Type	
guestbook	utf8mb4_0900_ai_ci	utf8mb4	User	⋮
hospital	utf8mb4_0900_ai_ci	utf8mb4	User	⋮
information_schema	utf8mb3_general_ci	utf8mb3	System	⋮
mysql	utf8mb3_general_ci	utf8mb3	System	⋮
performance_schema	utf8mb4_0900_ai_ci	utf8mb4	System	⋮
sys	utf8mb4_0900_ai_ci	utf8mb4	System	⋮
zoo	utf8mb4_0900_ai_ci	utf8mb4	User	⋮

Replikacija podataka u Cloud SQL-u

Primarna instanca i replike za čitanje

Replikacija podataka je proces stvaranja i održavanja kopije podataka izvorne baze podataka na drugim mestima. U kontekstu Cloud SQL-a, replikacija podataka omogućava automatsko kopiranje i sinhronizaciju podataka sa primarnom bazom podataka na jednu ili više replika.

Replicirana instanca = primarna instanca

Kopije = replike za čitanje

Provera preduslova za kreiranje replike za čitanje


```
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql instances describe myfirstinstance
backendType: SECOND_GEN
connectionName: maximal-symbol-391019:us-central1:myfirstinstance
createTime: '2023-06-27T12:49:04.395Z'
databaseInstalledVersion: MYSQL_8_0_33
databaseVersion: MYSQL_8_0_33
etag: ffd90f633c3dadc1894ad996864adbaf18504cebdd4561f91d785269957b8ad7
failoverReplica:
  available: true
gceZone: us-central1-f
instanceType: CLOUD_SQL_INSTANCE
ipAddresses:
- ipAddress: 34.135.107.131
  type: PRIMARY
kind: sql#instance
maintenanceVersion: MYSQL_8_0_33.R20230530.03_00
name: myfirstinstance
project: maximal-symbol-391019
region: us-central1
secondaryGceZone: us-central1-c
selfLink: https://sqladmin.googleapis.com/sql/v1beta4/projects/maximal-symbol-391019/instances/myfirstinstance
serverCaCert:
  cert: |-
    -----BEGIN CERTIFICATE-----
    MIIDfzCCAmegAwIBAgIBADANBgkqhkiG9w0BAQsFADB3MS0wKwYDVQQuEyRiMTMz
    MzRmZS01MjQ1LTRlMDQtOTg2My1hZmFlMWVhOTllZjIxIzAhBgNVBAMTGkdvb2ds
```

```
    backupConfiguration:
      backupRetentionSettings:
        retainedBackups: 7
        retentionUnit: COUNT
      binaryLogEnabled: true
      enabled: true
      kind: sql#backupConfiguration
      location: us
      startTime: 14:00
      transactionLogRetentionDays: 7
    connectorEnforcement: NOT_REQUIRED
```

Kreiranje replike za čitanje


```
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql instances create myfirstreplica
--master-instance-name=myfirstinstance
WARNING: Starting with release 233.0.0, you will need to specify either a region or a zone to
create an instance.
Creating Cloud SQL instance for MYSQL_8_0_33...done.
Created [https://sqladmin.googleapis.com/sql/v1beta4/projects/maximal-symbol-391019/instances/
myfirstreplica].
NAME: myfirstreplica
DATABASE_VERSION: MYSQL_8_0_33
LOCATION: us-central1-f
TIER: db-custom-4-26624
PRIMARY_ADDRESS: 35.202.194.101
PRIVATE_ADDRESS: -
STATUS: RUNNABLE
```

SQL

Replicas

PRIMARY INSTANCE

- Overview
- System insights
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- Users
- Databases
- Release Notes

All instances > myfirstinstance

✅ myfirstinstance

MySQL 8.0

You can create read replicas from any primary instance to replicate your data.

You can create cascading replicas (replicas of replicas) to build replication hierarchies. Learn more ↗

➕ CREATE READ REPLICA

Name ↑	Type	Version	Location
✅ myfirstreplica	MySQL read replica	MySQL 8.0	us-central1-f

Rezervne kopije u Cloud SQL-u

Dve vrste rezervnih kopija

AUTOMATSKE REZERVNE KOPIJE

- Kreiraju se u unapred definisanim vremenskim intervalima
- Na primer, može se konfigurisati prozor za automatske rezervne kopije koji definiše vremenski interval od 22:00 do 06:00 svakog dana.
- Kopije će se generisati samo tokom tog vremenskog intervala, što omogućava kontrolu kada će se izvršiti proces i smanjuje potencijalni uticaj na performanse sistema tokom aktivnih radnih sati

RUČNO KREIRANE REZERVNE KOPIJE PO ZAHTEVU

- Kreiraju se u bilo kom trenutku
- Nazivaju se i on-demand kopije
- Omogućavaju kreiranje snimaka trenutnog stanja baze podataka što je korisno kada želimo da očuvamo trenutno stanje pre nekih rizičnih promena u bazi

Create a Backup

Backups allow you to restore instances to recover lost data or undo errors.

To help you save money, backups work incrementally. Each backup stores only the changes to your data since the previous backup. Learn more

🛈 You'll be billed $0.08/GB per month for data storage.

Describe this backup (optional)

You can make a note here to help you identify this backup.   0 / 140

Choose where to store your backups

Backups are stored in the closest multi-region location to you by default. Only customize if needed.

🔘 Multi-region (default)

⚪ Region

Location *
us - Data centers in the Un... ▼

∧ LOCATION OPTIONS

CREATE   CANCEL

Kreiranje kopije na zahtev pomoću User interface-a

Kreiranje kopije na zahtev pomoću gcloud naredbe

Kreiranje automatske rezervne kopije pomoću komandne linije

Lista svih backup-ova instance preko gcloud komandne linije

Lista svih backup-ova instance preko API-a

Visoka dostupnost (HA) u Cloud SQL-u

Omogućavanje HA kroz komandnu liniju gcloud

```
milamirovic@cloudshell:~ (maximal-symbol-318123)$ gcloud sql instances failover myfirstinstance
Failover will be initiated. Existing connections to the master
instance will break and no new connection can be established during
the failover.

Do you want to continue (Y/n)?  Y

Failing over Cloud SQL instance...done.
milamirovic@cloudshell:~ (maximal-symbol-318123)$ gcloud sql connect myfirstinstancer
Allowlisting your IP for incoming connection for 5 minutes...done.
Connecting to database with SQL user [root].Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 95
Server version: 8.0.18-google (Google)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

Preusmeravanje

Oporavak od katastrofa u Cloud SQL-u

```
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql connect myfirstreplica
Allowlisting your IP for incoming connection for 5 minutes...done.
Connecting to database with SQL user [root].Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 3525
Server version: 8.0.33-google (Google)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use zoo;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+--------------+
| Tables_in_zoo |
+--------------+
```

```
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql instances patch myfirstreplica -
-no-enable-database-replication
The following message will be used for the patch API method.
{"name": "myfirstreplica", "project": "maximal-symbol-391019", "settings": {"databaseReplicati
onEnabled": false}}
WARNING: This patch modifies a value that requires your instance to be restarted. Submitting
this patch will immediately restart your instance if it's running.

Do you want to continue (Y/n)?  y

Patching Cloud SQL instance...done.
Updated [https://sqladmin.googleapis.com/sql/v1beta4/projects/maximal-symbol-391019/instances/
myfirstreplica].
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql instances patch myfirstinstance
--activation-policy NEVER
The following message will be used for the patch API method.
{"name": "myfirstinstance", "project": "maximal-symbol-391019", "settings": {"activationPolicy
": "NEVER"}}
Patching Cloud SQL instance...done.
Updated [https://sqladmin.googleapis.com/sql/v1beta4/projects/maximal-symbol-391019/instances/
myfirstinstance].
mila_mirovic@cloudshell:~ (maximal-symbol-391019)$ gcloud sql instances promote-replica myfirs
treplica
Promoting a read replica stops replication and converts the instance
```

```
milamirovic @cloudshell:~ ( maximal-symbol -318123)$ gcloud sql instances patch mytestreplica --activation-policy ALWAYS
The following message will be used for the patch API method.
{"name": "testreplica", "project": "bustling-cosmos-318123", "settings": {"activationPolicy": "ALWAYS"}}
Patching Cloud SQL instance...done.
```

Provera da je tip replike sada
PRIMARY

```
databaseVersion: MYSQL_8_0
etag: 78d53422ff18dd355af0c0c2889b7b5abda264a2edb0be84358c122641a12c6c
gceZone: us-central1-f
instanceType: CLOUD_SQL_INSTANCE
ipAddresses:
- ipAddress: 34.132.55.238
  type: PRIMARY
```

Hvala na pažnji!