

Keeping My Head in the Clouds:

Leveraging Google Cloud Run for
Automated Tasks



division of
**Technology
Services**

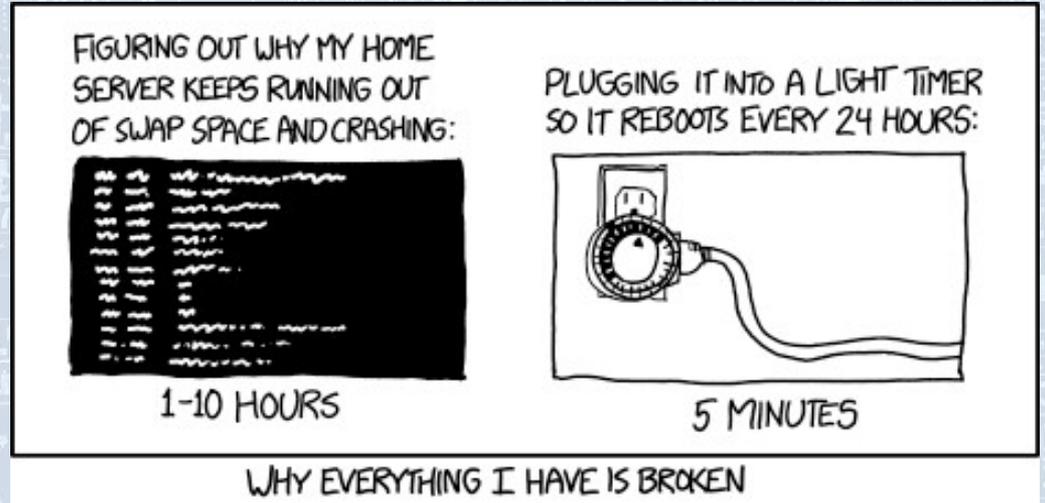


Utah Geospatial Resource Center

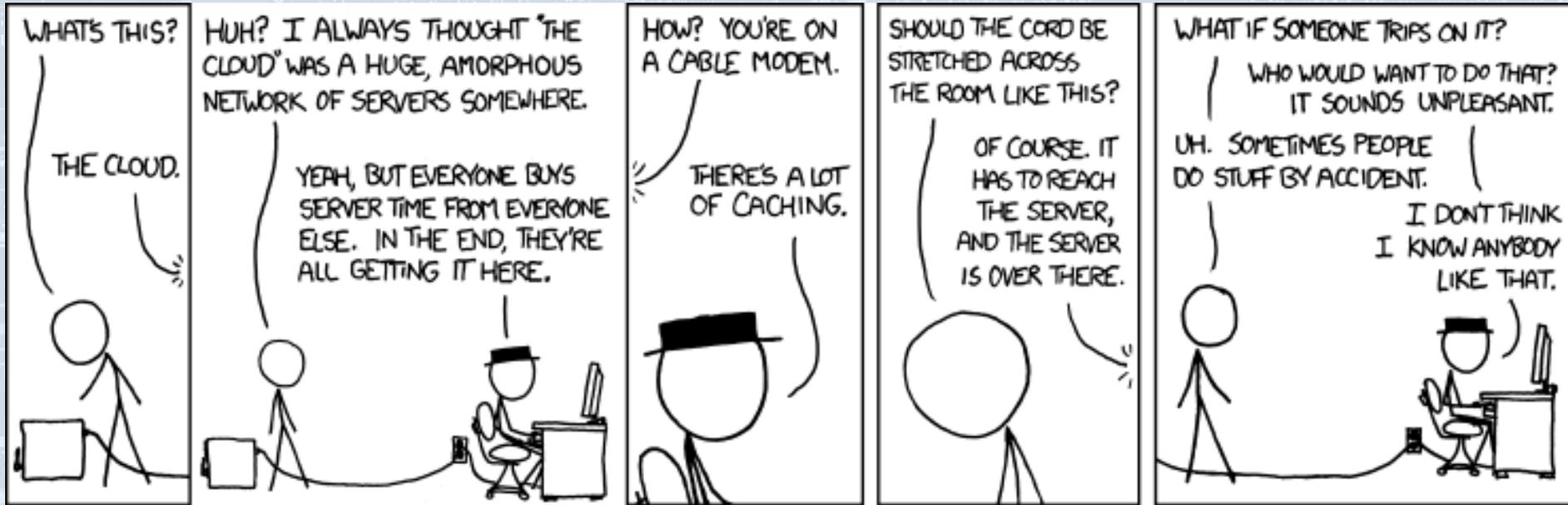
UGRC

The Scenario

How do I run a script on a regular basis without having to stand up, maintain, and secure my own server?



The Solution: The Cloud



The Cloud

Pros:

You don't have to manage the infrastructure. No servers to patch, no failed hardware to fix at 3:00 AM.

The Cloud

Pros:

You don't have to manage the infrastructure. No servers to patch, no failed hardware to fix at 3:00 AM.

Cons:

When it does fail, all you can do is watch



SpartanWire
@SpartanWire

Follow

Everybody right now.

#AWS #awscloud #awsoutage #awsdown #S3
#AWSs3 #Amazon



RETWEETS

443

LIKES

592

11:38 AM - 28 Feb 2017



6



443

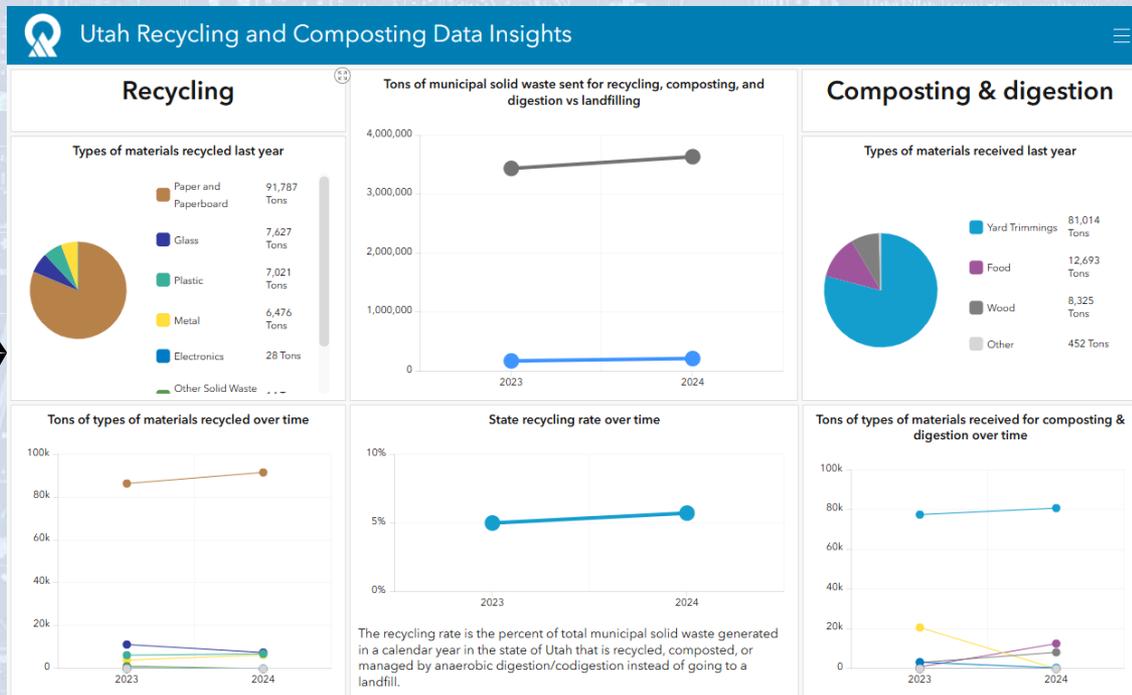


592

Examples



Google Sheets



Examples

The screenshot shows the 'Utah Flood Hazard Atlas' web application. At the top, there are logos for the Utah Department of Homeland Security and the Utah Flood Hazards and Floodplain Management program. The main navigation bar includes 'Homepage', 'FEMA Floodplains', 'Active Projects', 'Floods, Fires & Fans', and 'GIS Resources'. The 'FEMA Floodplains' tab is selected. The interface features a search bar at the top right with the placeholder text 'Find address or place'. Below the search bar is a map of Provo, Utah, displaying various flood hazard zones. A legend on the left side of the map is titled 'Flood Hazard Zones' and includes categories such as '1% annual chance flood', '0.2% annual chance flood', 'Area with reduced flood risk due to levees', and 'Regulatory floodway'. Below the legend is another section titled 'Other Flood Related Info' which includes 'Cross Sections', 'Base Flood Elevation', 'Letters of Map Revision', 'FIRM Panels', and 'Water Lines'. A search bar is also present on the map itself. At the bottom of the map area, there is a link that says 'Click to read about the data'. The bottom of the page contains contact information for the Utah Floodplain Mapping Program and a link to FEMA's Map Service Center.



Examples

FC Federal Communications Commission

UTAH
An official website

CONNECTING UTAH
ALL TEAM ALL ONLINE

Utah Residential Broadband Map

Legend Basemaps

Find address or place

Or

Zoom in on the map and click on a hexagon to see providers for that area

	Down (Mbps)	Up (Mbps)
Cable		
<u>Xfinity</u>	2,000	250
DSL		
<u>CenturyLink</u>	140	100
Fiber		
<u>CenturyLink</u>	1,000	1,000
<u>Google Fiber</u>	8,000	8,000
<u>Quantum Fiber</u>	8,000	8,000
Fixed Wireless		
<u>AT&T</u>	25	3
<u>T-Mobile</u>	100	20
<u>Utah Broadband</u>	1,000	1,000
<u>Verizon</u>	300	20
Satellite		
<u>HughesNet</u>	100	5

Map Filters

Minimum Download
100

Minimum Upload
20

Technology
0 Selected

Provider
0 Selected

Powered by Esri

Google Cloud Run

- Your **Script**
- Running in a **Docker Container**
- In the **Google Cloud Platform**
- Started by various **Triggers**



Your Script

In setup.py:

```
setup(  
    ...  
    packages=find_packages("src"),  
    package_dir={"": "src"},  
    include_package_data=True,  
    install_requires=["ugrc-palletjack>=5.0,<6.1", "ugrc-supervisor>=3.1.3"],  
    entry_points={"console_scripts": [  
        "project-portal-skid = project_portal_skid.main:process"  
    ]},  
)
```

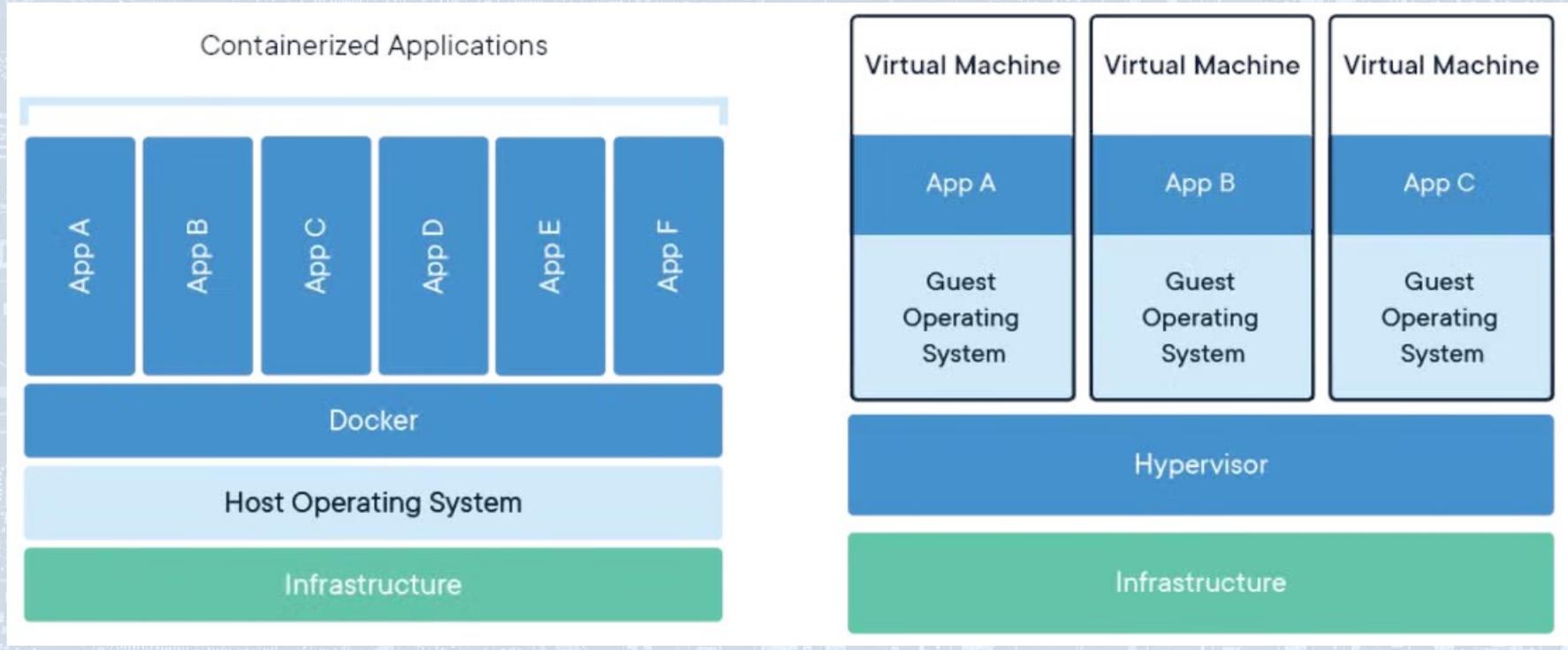
Docker Containers



Docker Containers

A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another ... [It] includes everything needed to run an application: code, runtime, system tools, system libraries and settings.

Docker Containers



Dockerfile

```
FROM python:3.11-slim
# Allow statements and log messages to immediately appear in the Knative logs
ENV PYTHONUNBUFFERED=True
USER root
RUN useradd -s /bin/bash dummy
# Set the locale
RUN apt-get update && apt-get install -y locales && localedef -i en_US -c -f UTF-8 -A
/usr/share/locale/locale.alias en_US.UTF-8 && apt-get install -y gcc && apt-get install -y
libkrb5-dev && pip install requests-kerberos
COPY . /app
WORKDIR /app
RUN pip install .
USER dummy
ENTRYPOINT ["broadband-data"]
```

The Google Cloud Platform



Google Cloud

The Google Cloud Platform

Google Cloud Platform	Amazon Web Services ^[51]	Microsoft Azure ^[52]	Oracle Cloud ^[53]
Google Compute Engine	Amazon EC2	Azure Virtual Machines	Oracle Cloud Infra OCI
Google App Engine	AWS Elastic Beanstalk	Azure App Services	Oracle Application Container
Google Kubernetes Engine	Amazon Elastic Kubernetes Service	Azure Kubernetes Service	Oracle Kubernetes Service
Google Cloud Bigtable	Amazon DynamoDB	Azure Cosmos DB	Oracle NoSQL Database
Google BigQuery	Amazon Redshift	Azure Synapse Analytics	Oracle Autonomous Data Warehouse
Google Cloud Functions	AWS Lambda	Azure Functions	Oracle Cloud Fn
Google Cloud Datastore	Amazon DynamoDB	Azure Cosmos DB	Oracle NoSQL Database
Google Cloud Storage	Amazon S3	Azure Blob Storage	Oracle Cloud Storage OCI

Tiggers

Cloud Run Service:

A script that responds to an HTTPS request sent to a REST endpoint

- When some client sends an HTTP GET request, perform an action

Cloud Run Job:

A script that runs based on a Cloud Scheduler trigger or Cloud Workflow

- Run this script every Monday morning at 3:00 AM

Scheduled Job

Job details [Execute](#) [View & edit job configuration](#) [Delete](#) [Learn](#) [Refresh](#)

Job: default Region: us-central1 Last updated: Feb 17, 2026, 5:37:08 PM

[History](#) [Observability](#) [Triggers](#) [YAML](#)

[Filter](#) Filter history

Execution ID	Creation time	Tasks	End time	Actions
<input checked="" type="radio"/> <input checked="" type="checkbox"/> default-v8896	Mar 2, 2026, 3:00:04 AM	1/1 completed	Mar 2, 2026, 3:52:51 AM	⋮
<input type="radio"/> <input checked="" type="checkbox"/> default-wlvsv	Feb 23, 2026, 3:00:04 AM	1/1 completed	Feb 23, 2026, 3:48:35 AM	⋮
<input type="radio"/> <input checked="" type="checkbox"/> default-q6dvs	Feb 17, 2026, 5:48:09 PM	1/1 completed	Feb 17, 2026, 6:37:34 PM	⋮
<input type="radio"/> <input checked="" type="checkbox"/> default-dq4hg	Feb 17, 2026, 8:04:16 AM	Cancelled	—	⋮
<input type="radio"/> <input checked="" type="checkbox"/> default-jm4pv	Feb 16, 2026, 3:00:01 AM	1/1 completed	Feb 16, 2026, 3:49:33 AM	⋮
<input type="radio"/> <input checked="" type="checkbox"/> default-9gkpk	Feb 9, 2026, 3:00:05 AM	1/1 completed	Feb 9, 2026, 3:48:29 AM	⋮
<input type="radio"/> <input checked="" type="checkbox"/> default-wnlqz	Feb 2, 2026, 3:00:02 AM	1/1 completed	Feb 2, 2026, 3:49:52 AM	⋮
<input type="radio"/> <input checked="" type="checkbox"/> default-4t7vz	Jan 26, 2026, 3:00:01 AM	1/1 completed	Jan 26, 2026, 3:48:02 AM	⋮

Tasks overview (1): ● 1 Succeeded ● 0 Failed ● 0 Running

[Tasks](#) [Containers](#) [Networking](#) [Security](#) [YAML](#)

[Filter](#) Filter tasks

Task	Last exit code	Retries	Start time	End time
<input checked="" type="checkbox"/> 0	0	0	Mar 2, 2026, 3:01:44 AM	Mar 2, 2026, 3:52:50 AM

Show Me the Money

Group by (Service) ▾

Time range by invoice month (February 2025 – February 2026) ▾

Projects (1 of 142) ▾

Invoice level charges (All) ▾

Show more



Download CSV

Service	Usage cost ?	Savings programs ?	Other savings ?	Subtotal	% Change ?
Artifact Registry	\$7.93	–	–	\$7.93	↑ 19%
Cloud Run	\$5.07	–	–	\$5.07	↑ 9%
Secret Manager	\$1.50	–	–	\$1.50	↑ 1%
Cloud Scheduler	\$1.11	–	–	\$1.11	↑ 6%

Subtotal \$15.62
Filtered total ? \$15.62

Google Cloud Run

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Palletjack and Skids

- github.com/ugrc/palletjack
- github.com/ugrc/skid



UGRC

Utah Geospatial Resource Center

gis.utah.gov/presentations

jdadams@utah.gov

Keeping My Head in the Clouds:

Leveraging Google Cloud Run for
Automated Tasks

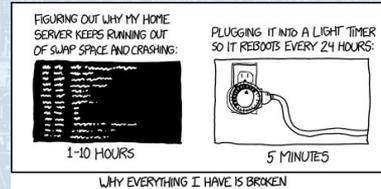


division of
**Technology
Services**



The Scenario

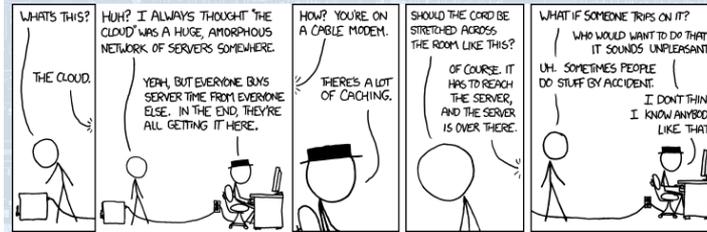
How do I run a script
on a regular basis
without having to stand
up, maintain, and
secure my own server?



Source: <https://xkcd.com/1495/>

Running your own server is difficult and comes with lots of responsibilities. How do we sidestep those so we can spend more time GISing?

The Solution: The Cloud



Source: <https://xkcd.com/908/>

The solution: run it in the cloud. What is the cloud? Someone else's computer, and network, and problem.

The Cloud

Pros:

You don't have to manage the infrastructure. No servers to patch, no failed hardware to fix at 3:00 AM.



What is the cloud? Someone else's computer, and network, and problem.

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When it does fail, all you can do is watch



What is the cloud? Someone else's computer, and network, and problem.

Examples

The dashboard displays the following data:

Category	Material Type	2023 (Tons)	2024 (Tons)
Types of materials recycled last year	High yield	41,267	41,267
	Food	7,222	7,222
	Textiles	7,222	7,222
	Plastics	4,453	4,453
	Other Low Yield	27,744	27,744
Types of materials received last year	Food	13,814	13,814
	Textiles	14,473	14,473
	Plastics	4,453	4,453
	Other	7,000	7,000
	High Yield	162,100	162,100

Utah Geospatial Resource Center
UGRC
<https://recycle.utah.gov>

Utah Recycling and Waste Facility Map and Dashboard uses data from both Google Sheets and Salesforce, updated weekly.

Examples



<https://experience.arcgis.com/experience/646356d3a2eb4db4bf6397edff54c09d>

We make a copy of the FEMA floodplain feature services on a weekly basis for the Department of Emergency Management

Examples

FC Federal Communications Commission

UTAH **UTAH** Utah Residential Broadband Map

List Providers At

Find address or place

Or

Zoom in on the map and click on a hexagon to see providers for that area

Cable	Optima 16
	(Spectrum) (Xfinity)
	5,000 212
DSL	
	145 100
Fiber	
	1,000 1,000
	4,000 4,000
	6,000 4,000
Fixed Wireless	
	25 1
	100 25
	1,000 1,000
	100 25
Terrestrial	
	100 5

Map Filters

Maximum Download

100

Maximum Upload

20

Technology

5 Selected

Provider

5 Selected

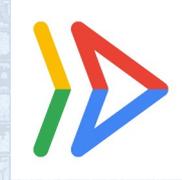


<https://broadband.ugrc.utah.gov>

The Utah Residential Broadband Map uses data extracted from the FCC's API on a monthly basis

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The solution: Run it in the cloud. ie, "serverless"

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    entry_points={"console_scripts": [  
        "project-portal-skid = project_portal_skid.main:process"  
    ]},  
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```



<https://github.com/agrc/skid>

Make it pip-installable

Docker Containers



A container is a portable, lightweight, isolated environment packaged with your code.

Docker Containers

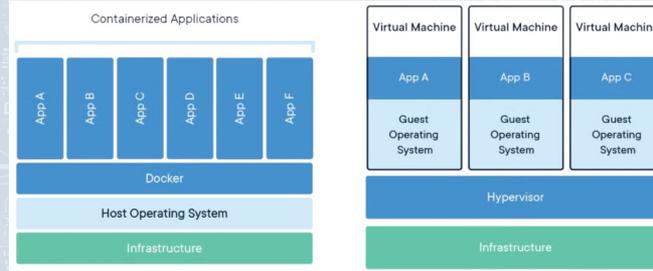
A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another ... [It] includes everything needed to run an application: code, runtime, system tools, system libraries and settings.



Source: <https://www.docker.com/resources/what-container/>

A container is a portable, lightweight, isolated environment packaged with your code.

Docker Containers



Source: <https://www.docker.com/resources/what-container/>

Containers are another step up the abstraction ladder from VMs

Dockerfile

```
FROM python:3.11-slim
# Allow statements and log messages to immediately appear in the Knative logs
ENV PYTHONUNBUFFERED=True
USER root
RUN useradd -s /bin/bash dummy
# Set the locale
RUN apt-get update && apt-get install -y locales && localedef -i en_US -c -f UTF-8 -A
/usr/share/locale/locale.alias en_US.UTF-8 && apt-get install -y gcc && apt-get install -y
libkrb5-dev && pip install requests-kerberos
COPY . /app
WORKDIR /app
RUN pip install .
USER dummy
ENTRYPOINT ["broadband-data"]
```



Containers are built from a Dockerfile and run using a container manager like Docker or Podman

The Google Cloud Platform



Google Cloud



Cloud run is a product in the Google Cloud Platform, or GCP

The Google Cloud Platform

Google Cloud Platform	Amazon Web Services ^[51]	Microsoft Azure ^[52]	Oracle Cloud ^[53]
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Google Kubernetes Engine	Amazon Elastic Kubernetes Service	Azure Kubernetes Service	Oracle Kubernetes Service
Google Cloud Bigtable	Amazon DynamoDB	Azure Cosmos DB	Oracle NoSQL Database
Google BigQuery	Amazon Redshift	Azure Synapse Analytics	Oracle Autonomous Data Warehouse
Google Cloud Functions	AWS Lambda	Azure Functions	Oracle Cloud Fn
Google Cloud Datastore	Amazon DynamoDB	Azure Cosmos DB	Oracle NoSQL Database
Google Cloud Storage	Amazon S3	Azure Blob Storage	Oracle Cloud Storage OCI



Source: Wikipedia

GCP is a wide suite of cloud offerings to provide various levels of infrastructure-as-a-service hosted on Google's servers and network

Tiggers

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Cloud Run Job:

A script that runs based on a Cloud Scheduler trigger or Cloud Workflow

- Run this script every Monday morning at 3:00 AM



Source: <https://docs.cloud.google.com/run/docs/overview/what-is-cloud-run>

Cloud run scripts can be kicked off multiple ways. We mainly use Jobs, but are investigating Services for webhook-based workflows

Scheduled Job

Job details | Execute | View & edit job configuration | Delete | Learn | Help

Job: default | Region us-central1 | Last updated: Feb 17, 2025, 5:37:08 PM

History | Observability | Triggers | YAML

Filter history

Execution ID	Creation time	Tasks	End time	Actions
default-v6896	Mar 2, 2025, 3:00:04 AM	1/1 completed	Mar 2, 2025, 3:45:31 AM	
default-v6895	Feb 23, 2025, 3:00:04 AM	1/1 completed	Feb 23, 2025, 3:45:31 AM	
default-v6894	Feb 17, 2025, 5:48:09 PM	1/1 completed	Feb 17, 2025, 6:37:34 PM	
default-v6893	Feb 17, 2025, 6:54:16 AM	Cancelled	—	
default-v6892	Feb 16, 2025, 3:00:03 AM	1/1 completed	Feb 16, 2025, 3:45:31 AM	
default-v6891	Feb 9, 2025, 3:00:03 AM	1/1 completed	Feb 9, 2025, 3:45:29 AM	
default-v6890	Feb 2, 2025, 3:00:03 AM	1/1 completed	Feb 2, 2025, 3:45:32 AM	
default-v6782	Jan 28, 2025, 3:00:03 AM	1/1 completed	Jan 28, 2025, 3:45:32 AM	

Tasks overview (7)

1 Succeeded 0 Failed 0 Running

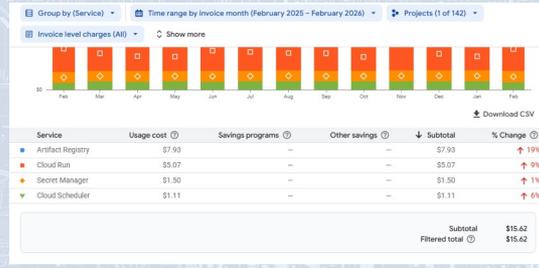
Tasks | Containers | Networking | Security | YAML

Task	Last exit code	Retries	Start time	End time
0	0	0	Mar 2, 2025, 3:31:44 AM	Mar 2, 2025, 3:32:30 AM



Here's a job that goes off every Monday at 3:00 and runs for about 45 minutes each time

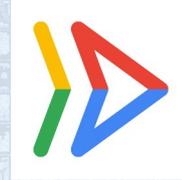
Show Me the Money



This is my Cloud Run job with the longest runtime- ~50 minutes every week. \$15.62 total over a year.

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- github.com/ugrc/palletjack
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