

geoCML v0.1.0 Documentation

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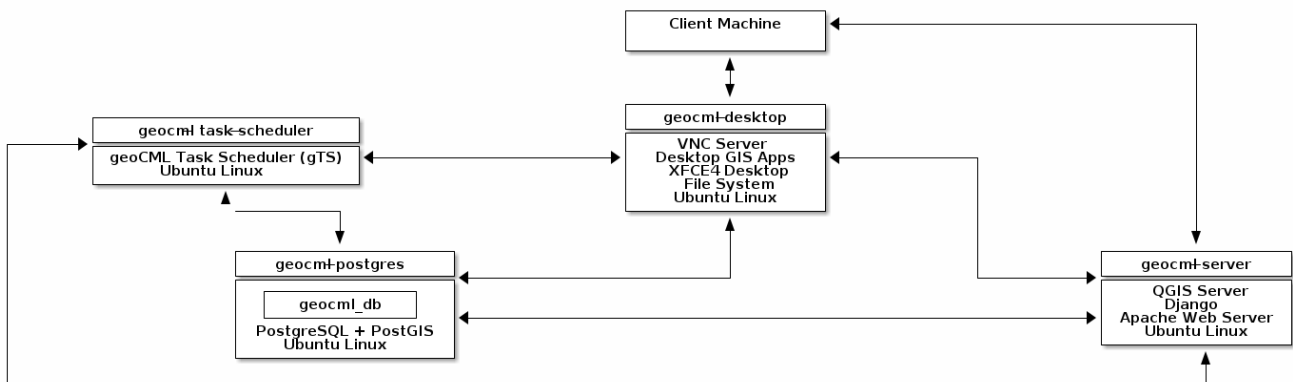
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Introduction to geoCML

geoCML is a Containerized, Multi-paradigm, Lightweight deployment pattern for geographic information systems running locally or in the cloud. geoCML deployments package best-in-class open-source GIS software including QGIS and PostGIS allowing you to quickly go to production. In this topic, you will learn how geoCML deployments work and be able to make an informed decision about whether geoCML is a good choice your needs.

How does geoCML work?

geoCML deployments include four containerized microservices: geocml-desktop (the primary user entryptoint), geocml-server (the secondary user entryptoint), geocml-postgres, and geocml-task-scheduler (often abbreviated as gTS). Each service can communicate with each other via an internal network called geocml-network. Once deployed as a geoCML instance, you can begin using geoCML to complete GIS workflows. By design, each geoCML instance should host only one project/dataset. Multiple datasets should be hosted across multiple geoCML instances. The following diagram outlines the system architecture for geoCML deployments and the paths of communication between services and clients.



Specific documentation on each service is available for your reference.

What can geoCML do?

geoCML comes with a variety of features:

- Common desktop GIS workflows
- Common server GIS workflows
- Routine database backups
- PostgreSQL/PostGIS database hosting
- Python support for writing custom gTS automation tasks
- Persist information between containerized services
- Use less space/resources than other GIS deployments
- Cloud native GIS workflows

- Multi user workflows (multiple users working within the GIS at a time)

What can geoCML *not* do out of the box?

geoCML is currently limited in the following areas:

- Integration with ArcGIS proprietary deployments and extensions
- Database version management
- Backup domain values in a database
- MySQL support, SQL Server support, etc (base deployments only support PostgreSQL/PostGIS)

geoCML base deployments are customizable to fit your specific needs. You can customize your services however you'd like! If you would like to contribute to the development of geoCML, you can find the project on GitHub at github.com/geocml.

Quick deployment guide

Get up and running with geoCML in under 15 minutes!

geoCML is multi-paradigm, offering a desktop GIS experience and a server GIS experience with a single deployment. You may host your geoCML instance locally or in the cloud, depending on your needs.

Before instantiating a geoCML deployment, you must have [Docker](#) and [Docker Compose](#) installed on the machine you want to host geoCML on. Once you have satisfied these conditions, please follow the following steps to deploy your geoCML instance.

1. Clone the geoCML source code from github.com/geocml/geocml-base-deployment
2. Open a terminal and cd into the source code directory
3. Run `docker compose pull` to pull geoCML service images from the project's hosted container registry (optionally, run `docker compose build` to build the images on your machine; this is a requirement if you are modifying your images and have not pushed them to your own registry!)
4. Run `docker network create geocml-network`
5. Run `docker compose up -d` to bring up the instance

That's it! You can access geocml-desktop via {deployment host URL}:5901 using a VNC client, or geocml-server portal via {deployment host URL} using a web browser. Further configuration steps for each of these services are discussed in later topics.

geoCML Desktop

geoCML Desktop is the primary access point for your geoCML deployment. geoCML Desktop provides you with a full-serviced, immutable desktop environment allowing you to prepare, visualize, and analyze your GIS data. The geocml-desktop container is based on Ubuntu Linux and comes install with the XFCE desktop environment. geoCML Desktop comes preinstalled with the following applications:

- [QGIS](#)
- [Evince](#)

Additional packages may be added to geoCML Desktop to fit your needs.

Connecting to geoCML Desktop

After deploying your geoCML base deployment, you can connect to geoCML Desktop with a VNC viewer application. The geoCML development team recommends using [TigerVNC](#). You can connect to geoCML Desktop via {deployment host URL}:5901 within your VNC viewer application. geoCML Desktop is a password protected service; you will be required to provide a password before connecting to geoCML Desktop. By default, the password for geoCML Desktop is 'headless'.

Using geoCML Desktop

geoCML Desktop is designed to be a replacement for your typical desktop GIS experience. With the default geoCML Desktop, you can:

- Use QGIS to prepare, aggregate, and visualize your GIS data
- Open PDFs with Evince
- Connect to the geocml-postgres service

You can customize geoCML Desktop with additional functionality based on your needs.

Customizing geoCML Desktop

You may want to extend the default geocml-desktop service with additional applications or configurations that meet your needs. Customizing the geocml-desktop service involves updating the geocml-desktop Dockerfile. Open [geocml-base-deployment\Dockerfiles\Dockerfile.geocml-desktop](#) in your favorite text editor, and between the **Customize Container Here** and **End Customizations** comments, add your use-case specific geocml-desktop configuration steps.

For more information on writing Dockerfiles, visit <https://docs.docker.com/engine/reference/builder/>

Understanding the persistence layer

geoCML Desktop features an immutable file system; the file system within the service cannot be changed directly. You may wonder how, then, are we do upload and change datasets contained within the geocml-desktop service?

The persistence layer is a *mutable* directory shared between the geocml-desktop service and the

deployment's host machine. geoCML Base Deployments use Docker to bind the host machine's local persistence layer to a persistence layer within the geocml-desktop service. This binding allows you to add files to the host machine's persistence layer and have them available within the geocml-desktop service. The persistence layer for a geoCML Base Deployment may also be available to other services within the deployment.