
LeadingAgile Code Analysis Tool Docker Images

1. Gather Analysis Docker Images

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1. Container Usage

Run a container of the image. Using the `run_gather.sh` script will be easiest:

1.1. Run Gather Tools

1.2. Gather Tools Available

The `analysis/gather` docker image has several tools that can be used. This is like the 'plumbing' tools in `git` where the `analysis/gather-cli` image is like `git porcelain` tools. These can be used separately from the `gather-cli`, just be aware of their requirements and sequencing (some depend on the outputs of others).

1.2.1. gather

The main metrics gathering tool. Creates the metrics/ folders in the output folders and the data collected from the static analysis tools. Also creates the linguist/ data for the collection of languages used and the frequency/ data from analysing the git commit history.

```
usage: metrics.gather -r THE_REPO -o OUTPUT_FOLDER [--run-name
      RUN_NAME] [--start-date START_DATE] [-t NUM_STEPS] [-h]

Gather static code analysis statistics for a repository covering a
number of time increments.

Required:
  -r THE_REPO, --repo THE_REPO
                        A git repository URI or directory path
  -o OUTPUT_FOLDER, --output-folder OUTPUT_FOLDER
                        The desired output folder for reports to be
                        written.

Optional:
  --run-name RUN_NAME  A name for the gather run. Defaults to start
                        date (if given) or current datetime.
  --start-date START_DATE
                        The starting date to gather statistics from in
                        YYYY-MM-DD format.
  -t NUM_STEPS, --steps NUM_STEPS
                        The number of weeks (steps) to analyze.
  -h, --help           Show this help message and exit
```

1.2.2. statistics

Creates the statistics data from the analysis of the data collected by gather. The output is in the statistics/ folder.

```
usage: metrics.statistics --run-folder RUN_FOLDER [--team-config
      TEAM_CONFIG] [-h]

Generate statistics from a run of the gather tool. All output is
written to the run folder.

Required:
  --run-folder RUN_FOLDER
                        The run folder where the generated plots will
                        be written.

Optional:
  --team-config TEAM_CONFIG
                        A configuration file in YAML format to denote
                        which repository files/folders belong to a
                        team.
  -h, --help           Show this help message and exit
```

1.2.3. plotting

Plots the statistics data and the data from the frequency and linguist analyses.

```
usage: metrics.plotting --run-folder RUN_FOLDER [-h]

Generate plots for statistics from a run of the gather tool. All
output is written to the run folder.

Required:
  --run-folder RUN_FOLDER           The run folder where the generated plots will
                                   be written.

Optional:
  -h, --help                       Show this help message and exit
```

1.2.4. answers

Answers the GQM questions using the data from the metrics collection and statistics data.

```
usage: metrics.answers [-h] {repo,team} ...

Generate answers for assesment data from a run of the gather tool. All
output is written to the run folder.

Common Options:
  -h, --help    Show this help message and exit

Answers Commands:
  {repo,team}  Answer commands. Use '<comand> --help' for help
               specific to the command
  repo        Create a summary answer for a repository that includes
               all languages.
  team        Create a summary answer for all the repostories of a
               team. An answer for each repo must have already been created
               (see metric.answers repo)
```

repo

Create a summary answer for a repository that includes all languages.

```
usage: metrics.answers repo --run-folder RUN_FOLDER [--team-config
TEAM_CONFIG] [-h]

Required:
  --run-folder RUN_FOLDER           The run folder for the run data to be analyzed.

Optional:
  --team-config TEAM_CONFIG        A configuration file in YAML format to denote
                                   which repository files/folders belong to a
                                   team.
  -h, --help                       Show this help message and exit
```

team

Create a summary answer for all the repositories of a team. An answer for each repo must have already been created (see metric.answers repo).

```
usage: metrics.answers team --output-folder OUTPUT_FOLDER --run-name
      RUN_NAME [--team-config TEAM_CONFIG] [-h]

Required:
  --output-folder OUTPUT_FOLDER
                        The output folder where the metric gather runs
                        are stored.
  --run-name RUN_NAME  The name of the run to summarize for the team.
                        All repositories for the team must have a run with this name to
                        be included in the summary. The run selected must have already
                        had a repo
                        answer generated.

Optional:
  --team-config TEAM_CONFIG
                        A configuration file in YAML format to denote
                        which repository files/folders belong to a
                        team.
  -h, --help           Show this help message and exit
```

1.2.5. utility

Provides several utility functions:

```
usage: metrics.utility [-h] {frequency-subset} ...

Miscellaneous utilities

Common Options:
  -h, --help           Show this help message and exit

Utility Commands:
  {frequency-subset}  Utility commands. Use '<comand> --help' for help
                      specific to the command
  frequency-subset    Create a subset configuration for each of the
                      repositories based on the file commit frequency.
```

frequency-subset

Generate a team config for a subset of the files in the repositories based on the git frequency data.

```
usage: metrics.utility frequency-subset --output-folder OUTPUT_FOLDER
      --team-name TEAM_NAME --run-name RUN_NAME [--team-config
      TEAM_CONFIG] [--percent PERCENT] [--max-count MAX_COUNT]
      [--min-count MIN_COUNT]
                        [-h]

Required:
  --output-folder OUTPUT_FOLDER
```

	The output folder where the metric gather runs are stored.
<code>--team-name TEAM_NAME</code>	The name for the team or subset of the repositories.
<code>--run-name RUN_NAME</code>	The name of the run to summarize for the team. All repositories for the team must have a run with this name to be included in the summary. The run selected must have already had a repo answer generated.
<code>--team-config TEAM_CONFIG</code>	A configuration file in YAML format to denote which repository files/folders belong to a team.
<code>--percent PERCENT</code>	The percent of the most frequently modified files to include.
<code>--max-count MAX_COUNT</code>	The maximum number of the files to include.
<code>--min-count MIN_COUNT</code>	The minimum number of the files to include.
Optional:	
<code>-h, --help</code>	Show this help message and exit

1.3. Running the Tools

The analysis/gather docker image is used to run the tools. Use docker run to start a container from the image. The first argument after the image name is the name of the tools to run (see the list above). The remaining arguments are specific to the particular tool. To see the list of arguments for a tool, pass `--help`.

To get help for the statistics tool use a command like this:

```
docker run -it --rm
  leadingagilestudios.azurecr.io/analysis/gather:0.1.2 statistics
  --help
```

To run the gather tool to collect metrics for the Studios-private-test-data--line-chart-typescript repository, use a command like this:

```
docker run -it --rm \
  -v ~/metrics_data:/opt/repos/ \
  -v ~/report_folder:/opt/output/ \
  leadingagilestudios.azurecr.io/analysis/gather:0.1.2 \
  gather \
  -r /opt/repos/Studios-private-test-data--line-chart-typescript/ \
  -o /opt/output/from_docker \
  -t 52 \
  --run-name RUN_01
```

In each case, the tool name follows the image name and the tool parameters follow the tool name.

1.3.1. Run a Gather Dev Container

Open a linux (debian:buster) terminal at the code-analysis code folder.

Use your github username and PAT

Mount ~/metrics_data/ in the container as /opt/metrics_data (in case you need a host output folder)

Mount the folder with you already-cloned repositories as /opt/sample_code/ in the container.

Your host SSH keys from ~/.ssh will be registered inside the container so you ssh access should work.

```
docker run --rm \
  -e GITHUB_USER=<github_username> -e GITHUB_PAT=<github_PAT> \
  -v ~/projects/la/sample_code/:/opt/sample_code/ \
  -v ~/metrics_data/:/opt/metrics_data/ \
  leadingagilestudios.azurecr.io/analysis/gather-dev:0.2.1
```

NOTE: *The code in the container is a COPY of the state of the code-analysis code at the time the Image was created. It is NOT a git repository. If you make changes, they will disappear when you exit the container. Containers are ephemeral!.*

If you want to actually work on code while in the container, you have a couple of choices.

- Use the container as an experiment, let the code go when you exit, and redo it in the real world.
- git clone the code-repository repo into the container, work, commit, and push. Note: again, when you exit, this clone vanishes.
- Mount your host code folder into the container using a -v host_folder:container_folder option. This has risks. You are futzing with your host (MacOS) folder while in a Linux container. **Beware the Shenanigans!**

1.3.2. Run the Test Suite in a Gather Dev Container

The entry point for the gather-dev image can either open to a terminal command line or run scripts in the container. See above for a terminal command line.

Running a script passed to the container provides a way to run the test suite and exit with the error code from the tests. Anything after the image name in the docker run ... invocation will be executed using bash -c Passing the normal testing or linting scripts allows those to be run directly.

Caveats:

- It will run whatever you pass in but that should be limited to the sandbox of the container. **Beware the Shenanigans!**
- The linters are not necessarily all installed and configured in the container. If you run the linter script pass in the `-m -r` options to turn OFF MyPy and PyRight.
- You MUST pass in the GITHUB_USR and GITHUB_PAT values. The tests clone private repos at the LeadingAgile Github. This requires that the access credentials be used.

```
docker run -it --rm \
-e GITHUB_USR=<github_username> -e GITHUB_PAT=<github_pat> \
leadingagilestudios.azurecr.io/analysis/gather-dev:0.2.1 \
./tools/building/testing.sh -ra -n auto
```

1.3.3. Using the Gather CLI Container

See [DockerGatherCLIReadme.pdf](#).

2. Configuration for Using Images

2.1. SSH Config Updates

When running the Docker container from a Mac, you will need to update the `.ssh/config` for your SSH key with the following:

```
IgnoreUnknown UseKeychain
```

2.1.1. Example

```
Host *
  IgnoreUnknown UseKeychain
  AddKeysToAgent yes
  UseKeychain yes
  IdentityFile ~/.ssh/id_leadingagile
```

3. Pulling images from LeadingAgile Registry

- Be sure you have Pull permissions to the registry (see the admins)
Your user information will need to be added to the Studios Guest Access group
- You will need to log in to LeadingAgile Azure and authenticate your local Docker with the Container Registry (see below)

- Install the Azure CLI


```
brew install azure-cli
```
- Log in to Azure using your credentials


```
az login
```
- Authenticate with the Azure Container Registry for Studios


```
az acr login --name leadingagilestudios
```

If you are not a member of LeadingAgile, you will need to make sure that you authenticate with the LeadingAgile Azure and not your company's Azure.

Note that you will be required to set up Multi Factor Authentication with the LeadingAgile Azure instance during the login process.

```
az login --tenant 67c4be31-a39a-46a0-b5e7-b5c4a403220e az acr login --name leadingagilestudios --subscription 9ee9c1e0-2e28-407c-bf38-915a721b7628
```

- Pull the image


```
docker pull leadingagilestudios.azurecr.io/analysis/gather:0.2.1
```

The images currently available:

- leadingagilestudios.azurecr.io/analysis/gather:0.2.1
- leadingagilestudios.azurecr.io/analysis/gather-dev:0.2.1
- leadingagilestudios.azurecr.io/analysis/gather-cli:0.2.1

Note that the versions for these will change as we deploy updated versions of the tools.

4. Building Images Locally

If you really need to build an image locally:

4.1. Build for Docker images locally

- Start in code-analysis base repository folder
- Run the build images script:


```
./tools/docker/build_gather_dockers.sh 0.2.1
```

This will build the gather, gather-dev, and gather-cli docker images.