Logging in C++ with google logging library

Info: See http://google-glog.googlecode.com
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Description: This document outlines the use of google logging library

ABSTRACT

This document describes the facilities in the google logging library that may be used for a C++ project.

Using a logging library can assist developers with debugging code and help maintenance personnel with troubleshooting systemic problems. C++ developers often use `printf` or `cout` statements to check for proper code flow and to debug issues, but these statements must later be removed and can become tedious to manage or adjust over time. Many logging facilities feature helpful *logging levels* that allow the user to control logging at a specified level or above, all without the need for re-compilation.

Source Code Example

```cpp
#include <glog/logging.h>

int main(int argc, char *argv[])
{
  //FLAGS_stderrthreshold=google::INFO;
  //FLAGS_logtostderr = 1; // disabled logging to a file.
  //FLAGS_minloglevel = google::WARNING; // the default is INFO
  //FLAGS_v = 2;
  google::InitGoogleLogging(argv[0]);

  LOG(INFO) << "Something is happening.";
  LOG(WARNING) << "Warning something might not be setup right.";
  LOG(ERROR) << "Error has occurred, but trying to continue";
  LOG(FATAL) << "Program is dieing because...";

  VLOG(1) << "Something is happening";
  VLOG(2) << "Something detailed is happening";
  VLOG(3) << "Something very detailed is happening";
}
```

Note

no `std::endl` required.

Logging Types

Logging is divided into two types, each with levels. Generally, the most useful logs for administrators and users are those with INFO, WARNING, ERROR, and FATAL levels.

Verbose Logging allows users the ability to control how detailed the log messages are, which can be useful for developers and maintainers tracking the programs flow through algorithms.

Output

Calling `google::InitGoogleLogging(argv[0])` inside your program will set logs to output to stderr and separately to a log file in a `/tmp/` directory. Otherwise, logging will only be sent to stderr.

The name of the program (passed in `argv[0]`) is used as a part of the file name of the log files that are created in `/tmp/`. Unless otherwise specified, glog writes to the filename:

```
/tmp/<program name>.<hostname>.<user name>.log.<severity level>.<date>.<time>.<pid>
(e.g., "/tmp/hello_world.server.chad.log.INFO.20080709-222411.10474")
```

In addition to these log files, symbolic links are also generated that make it easier for the user to see the most recently generated logs. In the above example, the symbolic link would be named `/tmp/hello_world.INFO`.

Configuring

There are a number of ways in which the logging settings may be configured. Logging settings can be configured by either:

- Setting flags inside the source code (see the commented lines in the previous source code example)
- Providing command line arguments to the application that will set the flags (See google flags)
- Setting environment variables before the program starts

Most flags documented as a command line parameter can alternatively be used as a `FLAGS_` program variable or as a `GLOG_` environment variable.

> Note
>
> The command line arguments don't work out of the box without google flags, or some other command line argument processor.

Standard Output

By default, logs with level `ERROR` and `FATAL` will print to stderr in addition to being output to the logfile. This default level may be changed by setting the `FLAGS_stderrthreshold` variable either to 0 for `INFO`, 1 for `WARNING`, 2 for `ERROR`, or 3 for `FATAL`. The `GLOG_stderrthreshold` environment variable can be used the same way as demonstrated in the following example:

```
GLOG_stderrthreshold=0 ./hello_world
```

Log Levels

An administrator may decide that they don't want to clutter their files with too many INFO level logs. This can be adjusted by changing the logging levels. To change the logging level, run the program with different values for the environment variable `GLOG_minloglevel` set to 0 for `INFO`, 1 for `WARNING`, 2 for `ERROR`, and 3 for `FATAL`. Since it's a minimum, setting it to 1 for `WARNING` would include `ERROR` and `FATAL`, but exclude `INFO`.

```
GLOG_minloglevel=1 ./hello_world
```

Looking again at the source code example at the beginning of this document, if the line with the FLAGS_minloglevel flag is uncommented a default will be set that can be overridden by an argument or environment variable.

Verbose Log Levels

Verbose logging can be enabled globally via the `FLAGS_v` flag or the `GLOG_v` environment variable. It can also be enabled on a per-module basis using the `GLOG_vmodule` environment variable.

```
GLOG_vmodule=processor=2 GLOG_v=1 ./hello_world
```

The above example enables any `VLOG(2)` statements in `processor.h` or `processor.cpp`.

Installation

The google logging library and development header can be downloaded on google code.

Please read the INSTALL file for details. The following command should work to install:

```
sudo make install
```

Note

There are also RPM files on google code if you look for outdated files.

Compiling your programs

When linking your program you must pass the `-lglog` flag. You also use the following:

```
pkg-config --libs libglog
```