

# Logging in Java

## Using SLF4J and Logback

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# What's logging?

- Write out statements about what happens in the program
  - Which parts of the code were executed
  - In what order
  - With what parameters
  - Etc.
- Similar but  $\neq$ : temporary debug statements in the code
- Logging (generally) designates:
  - statements that stay in the code
  - and that follow a systematic strategy
- Write to temporary output: ?
- Or write to persistent output: ?
- Why log?

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# Why log?

- Debug information for the programmer
- Document your code
- Keep the statements in your code but disable output on demand
- Save time comparing to step-by-step debugging
- Debug hard to reproduce problems
- See what the libraries you use do
- Permit fine selection of what to show
- Example: only see statements related to some computation

# Frameworks

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- “Most” standard ([JSR 47](#)): Java util logging (JUL)
- But not the best technically
- Here: SLF4J + Logback
- SLF4J?

# Frameworks

- (Too) Many popular logging frameworks in Java
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- But not the best technically
- Here: SLF4J + Logback
- SLF4J? Simple Logging Facade for Java
- $\neq$  solutions generally interface well, e.g. Hibernate use JBoss Logging, but can interface with SLF4J

# Overview

- Interfaces (and some basic code) are in SLF4J
- You depend on `slf4j-api-xxx.jar`
- Permit to declare and invoke loggers in your code
- Declare a logger `LOGGER` in your class
- Invoke with `LOGGER.debug(String)`,  
`LOGGER.info(String)`...
- At run time: depend on a logger provider (an SLF4J binding)
- E.g. *logback*
- Provide a configuration file
- Specifies what and where to log



# Declare logger

- Loggers have names
- Permit to classify statements
- Typical pattern: logger name = class name
- Logger for a given class is in field `private static final Logger LOGGER`
- Because: no need to distinguish loggers per instance
- Obtain the logger using  
`LoggerFactory.getLogger(MyClass.class);`
- Advantage wrt  
`LoggerFactory.getLogger("mypackage.MyClass")?`

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Refactoring: explicit link to class

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# Log statements

Normal use of a [Logger](#):

```
LOGGER.debug("Temperature set to {}.  
    Old temperature was {}. ", t, oldT);
```

Log an exception:

```
int i;  
try {  
    i = Integer.parseInt(s); // s is a String  
} catch (NumberFormatException e) {  
    LOGGER.error("Failed to format {}", s, e);  
    i = -1;  
}
```

# SLF4J bindings

- Multiple bindings exist
- At runtime, have only one binding
- A set of classes that bind to SLF4J
- Put the right jar in the classpath
- Example, *Simple* binding: Sends all log statements to `System.err`
- Or JDK14: sends log statements to JUL
- We will rather use *Logback*

# Logback

- The main implementation for SLF4J
- No configuration file: outputs logs to `System.out`
- Much flexibility with configuration file(s)
- Put into the classpath
- Name: `logback.xml` or `logback.groovy` or `logback-test.xml`
- Configure: Logger, Appender and Layouts
- To enable and direct specific statements
- can also configure programmatically

# Logger level

- Loggers in a hierarchy: dot-separated
- Every logger may have an *assigned* log level (or `null`) root logger  
always has an assigned log level, default is DEBUG
- Every logger has an *effective* log level
- Used to filter received logs
- Example: a log request of level DEBUG is not sent to a logger with effective level INFO
- Log level not configured explicitly  $\Rightarrow$  inherited from parent
- If root has level DEBUG and no other is configured: all DEBUG
- If root has level DEBUG and X.Y has level INFO, X has effective level?

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# Appenders

- Appenders attached to a logger
- Indicate where to log
- Its children inherit the appenders
- Can log to console, a file, a DB, a remote server. . .

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