

# Logging and Tracing

## Purpose

The purpose of this document is to describe how microservices should log. As a note, this excludes infrastructure containers since they all have their own log formats. The goal of having a standard logging format for containers is to allow for easier debugging.

## Log Levels

The following standard log levels will be used. A description of each level will also be provided

<b>FATAL</b>	Very sever errors that will lead to the application crashing.
<b>ERROR</b>	Events that could be fatal but also allow the application to continue running.
<b>WARN</b>	Events that could lead to potentially harmful situations.
<b>INFO</b>	Informational messages that highlight the current state of the application
<b>DEBUG</b>	Events that will be useful for a developer when debugging
<b>TRACE</b>	Events that provides finer detail than DEBUG. This could be a dump of a data structure, progress of a task ect.

## Standard Logging Format

The standard log format for all services will be a JSON object:

```
{
  "timestamp": "2022-09-22T10:33:20.123456",
  "level": "FATAL|ERROR|WARN|INFO|DEBUG|TRACE",
  "service": "my-microservice",
  "session_id": "7cddeb94-4d9b-4231-bb5a-2c9ce889926c",
  "user_agent": "User agent here",
  "method": {
    "name": "someMethod",
```

```
{}"args": ["some", "args"]
},
{"message": "some super cool message",
  "stacktrace": "the stacktrace here if there is an error"
}
```

## PII (Personally Identifiable Information)

Personally Identifiable Information shall be removed from all logs. Some PII includes:

- Username
- Passwords
- API Tokens
- API Keys
- Names
- Age
- Addresses
- Phones
- SSN
- Bank account numbers
- Credit card numbers
- Biometric data
- Geographic data
- Date of birth
- ect

If PII should be put in a log message it should be changed to have only 5 \* characters. For instance, the full name "Kyle Heestand" would become "\*\*\*\*\*". This is to not only protect against the data in the database, but also to protect against people guessing who/what the data is based on the size of it. As an example, take a standard login message:

```
{
  "timestamp": "2022-09-22T10:33:20.123456",
  "level": "INFO",
  "service": "LoginService",
  "session_id": "7cddeb94-4d9b-4231-bb5a-2c9ce889926c",
  "user_agent": "User agent here",
  "method": {
    "name": "login",
    "args": ["kheestand", "some-password"]
  },
  "message": "Kyle Heestand has logged in"
```

```
}
```

After removing the PII, we will get something like this:

```
{
  "timestamp": "2022-09-22T10:33:20.123456",
  "level": "INFO",
  "service": "LoginService",
  "session_id": "7cddeb94-4d9b-4231-bb5a-2c9ce889926c",
  "user_agent": "User agent here",
  "method": {
    "name": "login",
    "args": ["*****", "*****"]
  },
  "message": "***** has logged in"
}
```

Obviously, you would more than likely have a different message, but we can see that the user's username, password and full name has been removed to preserve their privacy.

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