

Bachelor's Thesis
HPROF heap dump file support for AntTracks

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Start date: March 2019

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AntTracks comprises a modified Java VM based on the Hotspot VM, i.e., AntTracks VM, and an offline post-processing analysis tool, i.e., AntTracks Analyzer.

The VM's aim is to allow tracking of an application's entire life cycle by writing information about certain events to a trace file. This events include object allocations, object movements by the garbage collector, pointers between the objects and so on.

Such an event trace can then be analyzed in the offline post-processing tool. Based on the information parsed from the trace file, the tool can reconstruct a heap snapshot for any garbage collection point and, in addition to that, it can analyze the application's memory evolution over time.

Since a custom VM is needed to create such detailed trace files, most other memory analysis tools restrict their analyses to single heap snapshot, reconstructed from a heap dump file. Heap dump files (often called HPROF files) are created during a heap dump, a process that is supported by default by every major Java VM. They can be obtained using various tools such as the *HPROF agent* or *jmap*.

Adding support for HPROF heap dump files makes AntTracks more versatile. Even though not all of AntTracks's features can be exploited using a single reconstructed heap snapshot (e.g., no memory evolution analysis over time is possible), its modular heap snapshot analysis view as well as its heap graph visualization offer great alternatives to other state-of-the-art memory monitoring tools.

The goal of this thesis is to extend AntTracks to support the parsing of HPROF heap dump files. This includes at least (1) a parser that is able to read binary HPROF heap dump files[1], (2) a mapping of the read data to AntTracks's heap snapshot data structure, and (3) integration into AntTrack's current heap state analysis view.

Modalities:

The progress of the project should be discussed at least every two weeks with the advisor. A time schedule and a milestone plan must be set up within the first 3 weeks. It should be continuously refined and monitored to make sure that the thesis will be completed in time. The final version of the thesis must be submitted not later than 18.09.2019.

Helpful commands / tools:

`jcmd` – can be used to find out the process id (pid) of all running Java processes
`jmap` – can be used to create a HPROF heap dump of a running Java process
example: `jmap -dump:live,format=b,file="/path/to/dump.hprof"`

[1] Format: <http://hg.openjdk.java.net/jdk6/jdk6/raw-file/tip/src/share/demo/jvmti/hprof/manual.html>