REPORT ON OpenDreamKit DELIVERABLE D5.1

Turn the Python prototypes for tree exploration into production code, integrate to SAGE.

FLORENT HIVERT

Due on	01/12/2015 (M1)
Delivered on	23/12/2015
Lead	Université Paris-Sud (UPSud)
Progress on and finalization of this deliverable has been tracked publicly at: `https://github.com/OpenDreamKit/OpenDreamKit/issues/107`	

DELIVERABLE DESCRIPTION, AS TAKEN FROM GITHUB ISSUE #107 ON 2016-09-07

- **WP5:** High Performance Mathematical Computing
- **Lead Institution:** Université Paris-Sud
- **Due:** 2015-11-30 (month 3)
- **Submitted to Sage:** 2015-11-30
- **Merged into Sage:** 2016-04-08
- **Task**: T5.6 (#104)
- **Nature:** Demonstrator
- **Proposal:** p.51
- **Final report**, **slides**

MapReduce is a classical programming model for distributed computations where one maps a function on a large data set and use a reduce function to summarize all the produced information. A use case that occurs often e.g. in combinatorics is to have a data sets that is described by a recursion tree, and is too big to be expanded in memory. Instances include counting the number of elements in the data set, or collecting some statistics on them.

A prototype distributed implementation of this programming model had been written in 2010-2014 for SageMath, using multiple processes on a single machine and work-stealing for load balancing. In this deliverable, we have turned this prototype into production code and integrated it into the SageMath distribution.

See Trac Ticket 13580 for the source code and the discussion about the integration into Sage, as well as this snapshot of the documentation.

This work was presented at the journée du groupe de travail LaMHA at Université Pierre et Marie Curie on November the 26th of 2016. The slides give an overview of the motivations, algorithm, and implementation.