Software for Science

Marten Teitsma, Ed Kuijpers, Frank Aldershoff, Heiko van der Heijden
AUAS

Minor starting September 2018

The minor Software for Science offers assignments for teams to develop software for scientific experiments. Best practices for scientific programming will be taught and realised in projects for renowned scientific institutes. More information on https://SoftwareforScience.github.io

ALICE CERN

ALICE (A Large Ion Collider Experiment) is one of the seven detectors making use of CERN's Large Hydron Collider (LHC) and developed for the collision of Pb-Pb (lead to lead) ions. Collisions produce a so called Quark-Gluon Plasma which is assumed to have existed also less than one second after the Big Bang.

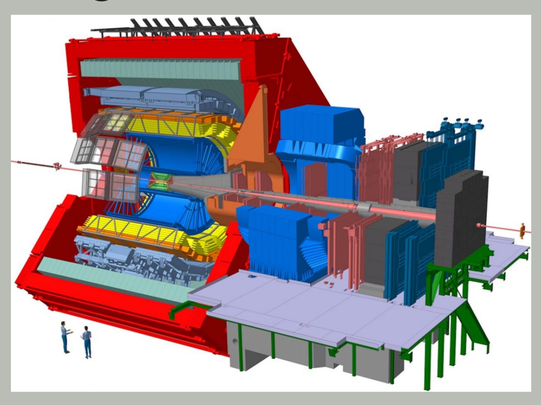

Figure: The ALICE detector

As of May 2017 the AUAS is an associate member of the ALICE collaboration and works on the following projects.

1. Load balancing. The enormous number of particles generates a data stream of approximately 1.1 Terabyte per second received by 268 computers and distributed to 1500 computers. We are looking for the most adequate algorithm for load balancing at ALICE.
2. Monitoring. To monitor ALICE an application for use in the operator room has to be developed.
3. Bookkeeping. The data which is produced by ALICE is reconstructed, calibrated and analysed. Everything which happens to these data is being registered. The AUAS develops the systems front end and back end doing this bookkeeping.

Program and application

You will start with a bootcamp to learn the tools needed for your project. Two courses, i.e. scientific method and scientific programming, tell you all there is to know about being a research software engineer. During the project you develop software for scientific experiments.
To apply for this excellence programme please send a motivational letter, portfolio and curriculum vitae to m.teitsma@hva.nl.

ASTRON SKA

ASTRON directs several experiments from its headquarters in Dwingeloo and collaborates in a new international project to create the Square Kilometre Array (SKA). This project combines telescopes in South Africa and Australia creating a larger apparatus to detect radio waves from the Universe.

Figure: The Meerkat telescope, a precursor to SKA, currently being built in South Africa.

The SKA research carried out by AUAS will focus on:

1. Visualising high-dimensional data sets. Using head mounted Virtual Reality displays we investigate how these devices can be used by a radio-astronomer to more effectively explore their data.
2. Monitoring energy consumption. Computing the enormous amount of data produced by SKA costs an exorbitant lot of money. To minimise this a close watch should be kept on energy consumption.

eScience center

Figure: Tomb of Hilarus Fuscus

For the eScience Center we are doing research on:

1. Via Appia. Along the via Appia (Rome-Brindisi) many burial buildings are ruined. To virtual reconstruct these monuments a 4D-visualisation of artefacts is made.
2. Pulsar detection. To detect pulsar, i.e. very fast rotating neutrino stars, software is developed which has to be re-engineered.