Volunteer Computing Experience with ATLAS@Home

David Cameron
Claire Adam Bourdarios
Andrej Filipcic
Eric Lancon
Wenjing Wu
on behalf of the ATLAS Collaboration
Volunteer Computing

- People volunteering their PC’s spare CPU cycles for science/mathematics/bitcoins...
- The most commonly used software is BOINC
- Why ATLAS@Home?
  - Free resources in a time of flat funding
  - Outreach and connecting to the public
ATLAS@Home jobs

- Volunteers run ATLAS MC simulation jobs inside a CERN VM Virtual Machine
  - 70% of our volunteers run Windows
- Jobs are taken from the ATLAS job management system (Panda) and submitted to BOINC server through ARC CE
  - No grid credentials distributed to volunteers
Experience so far

- Steady growth of volunteers
- 11-12k “running” job slots
  - Including those queued/suspended on the PC
- Translates to around 2-3k equivalent Grid job slots
- Providing 1-2% of overall ATLAS CPU

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ATLAS@Home, CHEP 16
Multicore support

- The limiting factor for many volunteers is the memory ATLAS software consumes
  - 2.3GB for VM + overhead -> max 1 job per 4GB
- In July 2016 a multicore version of ATLAS@Home was introduced
  - A “beta app” at first: volunteers had to opt-in to run it
  - From end August in production
- The app uses as many cores as available on the PC (up to 12)
- The VM is started with this many cores and memory=2.5GB + 0.8GB * ncores
  - 2 cores needs 4.1GB memory
  - 12 cores needs 12.1GB memory
- Before the job starts the ATLAS wrapper sets the number of cores for the job to use based on how many cores the VM has
Multicore results

Volunteers like it!

“By the way, I really like the Multicore Version, its probably the best change you have made since I started with Atlas :-)”
ATLAS@Home performance

- Running more than 8 cores showed very bad performance
- On 12 Sept the max core limit was reduced to 8

- ATLAS@Home is among the slowest Grid sites (but not the worst!)
- Expected due to non-dedicated hardware, configuring < 100% CPU usage etc
Graphical interface

- A personalised portal to ATLAS@Home
- Runs inside web server inside VM
- Volunteer clicks “show graphics” in BOINC client GUI to launch browser
Volunteers

- Two of our top volunteers are clusters/office PCs of ATLAS institutes
  - MPI Munich (Stefan Kluth)
  - Prague (Jiri Chudoba)
- Realising one original aim of the project
- Are we at the limit of BOINC expert volunteers?
  - Need to understand why people leave (a survey is planned)
  - How to attract non-tech people

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Many dedicated volunteers who are way more likely to help with problems than we are.
Future Work

- Enhancing the graphical interface to show real time information
  - Visualisation of events simulated, resources used etc
- Integration with ATLAS Event Service [link to talk], designed for opportunistic resources
- Expanding the volunteer base beyond the tech-savvy
- Proper accounting/recognition for contributing institutes
- New ATLAS workflows (although simulation currently provides enough workload)
- Alternatives to VirtualBox
  - eg native virtualisation platforms, docker on linux
Conclusions

- ATLAS@Home provides a useful non-negligible contribution to ATLAS computing resources
- It has been shown to be a viable lightweight solution for small sites
- New developments (multicore, graphics) keep volunteers interested and motivated
  - But a technology change is probably needed to attract the wider public
- Please join us!
  http://atlasathome.cern.ch