

STORY: SUPERCOMPUTER TRAINING

STORY OVERVIEW

The University of the Witwatersrand, SKA Africa, South Africa's National Research Foundation's iThemba Labs and CERN-SA in conjunction with a few other South African universities started the only state of the art training initiative and test lab in high-throughput computing for scientists in Africa in Johannesburg, South Africa. The main aim is to develop people with skills which will assist South Africa and the continent in addressing the issue of processing huge volumes of data lightning fast. This is called the "Big Data Problem" amongst scientists. Industry professionals and post-graduate students specializing in the hardware and software involved used in so called high-throughput computing are training up other scientists at this Johannesburg facility. Tutorial resources and support for scientists are also available as free downloads on the internet to researchers.

Science is fast being coming more complex and very detailed, generating ever bigger volume of data, ever quicker. Scientists talk about the "Big Data Storm" or the "The Big Data Tsunami". The quantities of data expected to be generated by research projects like the Square Kilometre Array in South Africa and the speed at which it will have to be processed, calls for a new generation of electronics and supercomputers. These computers are called [high-throughput supercomputers](#) and will process data in a different manner than current supercomputers do. Because they can do complicated tasks in cell phones of tables like opening and running emails, while using very little energy, the scientific community is now looking into basing new generation high-throughput supercomputers or ARM processors, says Prof Bruce Mellado of the High Energy Physics Group and SA-CERN. This technology could also be adapted to be used in other fields which are not traditionally associated with electronics or raw data processing like medical sciences, palaeosciences and engineering, according to him.

But in order to count in this league of "Big Data science projects" scientists agree that not only a infrastructure to manage and process data is necessary, it is also essential to also have people with the skills to who can manage data, as well as manage, develop, and maintain the infrastructure. Scientists therefore need to learn how to use, maintain and even adapt this technology and equipment. Even more importantly according to Prof Bruce Mellado of the High Energy Physics Group and SA-CERN, in order to make processing these volumes of data at these rates sustainably and affordably, equipment and skills must be locally available and produced.

Duration: 08:48

Shot list

1. **CU:** Face of scientist
2. **CU o/s:** Computer screen
3. **XCU:** Fingers typing away on keyboard
4. **MS:** 3 Scientist in front of computer screen

5. **WS pan right to left:** Interior establishment shot of training lab
6. **WS pan left to right:** Exterior establishment shot: street in front of University of the Witwatersrand and entrance to the university
7. **CU:** Post grad student & member of the Massive Affordable Computing Project insert GLIB card into carrier board used as part of the ARM processor technology based computer they are developing
8. **Mid WS:** Massive Affordable Computing project development team discussing and examining some of the hardware of the newly developed massive affordable high throughput super computer using ARM processors
9. **XCU:** Still pic ARM processor
10. **XCU:** Still pic ARM processor on finger tip
11. **UPSOUND: PROF BRUCE MELLADO: HIGH ENERGY PHYSICS GROUP: SCHOOL OF PHYSICS, UNIVERSITY OF THE WITWATERSRAND & MEMBER: SA-CERN**
"For us who are developing architecture, it's a new technology we have to understand. We have to understand how it works. We have to understand how it performs. So that we can efficiently combine them to a big cluster of ARM processors. So we are at the stage to understand this new technology that has not been used before in science."
12. **XCU:** Still photo: Samsung ARM processor on electronic board amongst other electronic components
13. **XCU:** Still photo: Apple ARM Processor on electronic board.
14. **MS o/s:** Man taking picture with tablet device
15. **MS tilt down:** Lady typing away on her tablet device
16. **CU:** Fingers typing on tablet device
17. **CU:** Cell phone & person scrolling up and down in documents on tablet device
18. **MS:** Men using tablet devices
19. **MS pan left to right o/s:** Scientist monitoring various computer screens and other instruments and devices in 'n control panel setup
20. **CU:** Computer screen with graphs
21. **UPSOUND: PROF BRUCE MELLADO: HIGH ENERGY PHYSICS GROUP: SCHOOL OF PHYSICS, UNIVERSITY OF THE WITWATERSRAND & MEMBER: SA-CERN**
"The ARM processors powers you tablets or you cell phones. We realized that because they're forced to spend a very little amount of electricity, yet to do complex things, like for instance opening emails, running emails, send stuff. So, do relatively complex operations, we realized that we could actually do that for massive computing. We could actually use ARM, this new technology, which is not necessarily new, because it's widely used for other purposes, than for scientific purposes. So this is an example of where a new technology which was used for something else or intended for something else, happens to be appropriate as core technology for a scientific application."
22. **MS:** Roach F - Reconfigurable Open Architecture Computing Hardware used by Square Kilometre Array, MeerKAT and KAT-7 projects
23. **XCU:** Electronic components inside Roach F

- 24.XCU:** Electronic components inside Roach F
- 25.XCU:** Various cables connecting 2 computers
- 26.MS:** Scientist typing on laptop
- 27.WS pan left to right:** Interior of training lab with scientist and students busy with training session / workshop
- 28.MS zoom out to WS:** Exterior of entrance to ATLAS experiment & HQ of CERN
- 29.Mid Wide tracking:** Large Hadron Collider
- 30.XW pan right to left:** Animation - SKA telescopes in Karoo
- 31.Mid Wide pan left to right:** Animation – SKA telescope in Karoo
- 32.UPSOUND: PROF BRUCE MELLADO: HIGH ENERGY PHYSICS GROUP: SCHOOL OF PHYSICS, UNIVERSITY OF THE WITWATERSRAND & MEMBER: SA-CERN**
“The hardware is standard. You can see it in leading institutions around the world. The setups, the connectivity, the lectures, the trainers are essentially highly qualified individuals. So, the education, the training you gonna get here is pretty much up to standards compared to those in the more developed so to say world. If you put it that way. Bear in mind that we also collaborate with Europe and some US institutions as well, so whatever we do is really embedded into a bigger picture. So yes, we are perfectly competitive. Our design is going to be used at CERN and the SKA.”
- 33.Mid Wide:** 3 Scientist looking at computer screen, 1 typing
- 34.CU:** Dr Simon Winberg
- 35.XCU:** Computer screen
- 36.UPSOUND: DR SIMON WINBERG: TRAINER: RECONFIGURABLE COMPUTING: UNIVERSITY OF CAPE TOWN**
“The reason for us choosing this equipment is that it is a new type of technology that is being used both industry and in many large scale projects. And there is a limited number of skills available for that. So especially in South Africa we need to boost the amount of experts in the field.”
- 37.WS pan left to right:** Lecture room with scientist listening to lecturer
- 38.MS:** Scientist listening to lecture in lecture room
- 39.WS zoom out pan tracking:** Animation MeerKAT radio telescope
- 40.Mid Wide:** Francois Kapp explaining Roach F - Reconfigurable Open Architecture Computing Hardware used by Square Kilometre Array, MeerKAT and KAT-7 projects to another person
- 41.CU:** Roach F - Reconfigurable Open Architecture Computing Hardware used by Square Kilometre Array, MeerKAT and KAT-7 projects
- 42.UPSOUND: FRANCOIS KAPP: TECHNOLOGY DEVELOPMENT MANAGER: SQUARE KILOMETRE ARRAY PROJECT – SOUTH AFRICA**
“For us having a training facility like this, a workshop like this, gathering people from various disciplines, is all about spreading the excitement that we have for the project to new people, to new industries, to new areas of research and training up new students, so that they can help us to build our instruments.”
- 43.Mid Wide tilt up:** Ion Source of iTemba accelerator

44. MS right to left: Ion source of accelerator of iTemba accelerator

45. WS pan left to right: Scientist in lecture hall

46. MS: Bongani Maqabuka (in front)

47. UPSOUND: BONGANI MAQABUKA: NUCLEAR PHYSICS PH.D.

CANDIDATE: UNIVERSITY OF JOHANNESBURG

“With the high-energy physics there’s a problem of huge data and how you deal with that. How you process that. It’s a challenge in terms of the hardware which is available and in terms of what are the future projections in terms of the line, which now the science or high-energy physics is going towards. So in a way this workshop, it has given a person like me that understanding and also to borrow from some of our other areas or disciplines.”

48. MS: Alexander Akoto-Danso and other scientist concentrating on computer screen

49. CU: Computer screen

50. CU: Alexander Akoto-Danso

51. UPSOUND: ALEXANDER AKOTO-DANSO: ASSISTANT RESEARCH

SCIENTIST: GHANA SPACE SCIENCE & TECHNOLOGY INSTITUTE

(SQUARE KILOMETER ARRAY PROJECT – GHANA: SOFTWARE TEAM MEMBER)

“The new technology will give me more opportunities for me to have more research topics to work on. It will also give me opportunity to learn and to impart that also on other people who don’t know the technology”

52. Mid WS pan left to right: Lecturer lecturing scientists

53. CU: Dr. Tom Dietel

54. Mid WS: Alice detector

55. Mid WS: Person on top on the Alice detector

56. WS: People in front of the Alice detector

57. UPSOUND: DR. TOM DIETEL: LECTURER UNIVERSITY OF CAPE TOWN & ALICE EXPERIMENT COLLABORATOR

“I think those technologies are very important to train the younger generation of people and we will also try to explore possibilities how we can actually come in with ALICE to train students on the projects that we are working on.”

58. Mid WS: Young scientists in training lab in front of computer screen

59. CU: Computer screen

60. CU: Young scientist

61. WS pan left to right: Young scientist in training lab busy learning how new high throughput computing technology works