Catering To Domain Specific eResearch needs : Genomics

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New Zealand eScience Infrastructure

Overview

1. Evolution (From Double Helix to Human Genome Project to exaFLOPS)
2. Current Research Areas In Genomics
3. NeSI & Genomics

Evolution : From Double Helix to Human Genome Project

Image Courtesy of : http://cen.xraycrystals.org/dna.html

A. Barrington Brown/Science Source

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Image Courtesy of :http://wi.mit.edu/about/history/genome

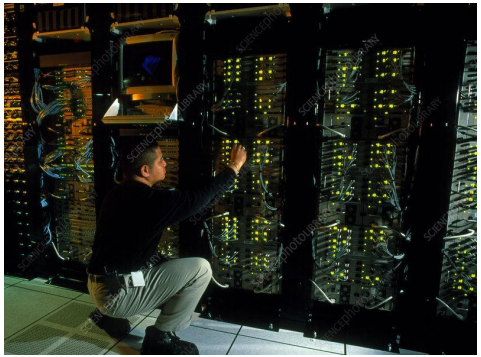
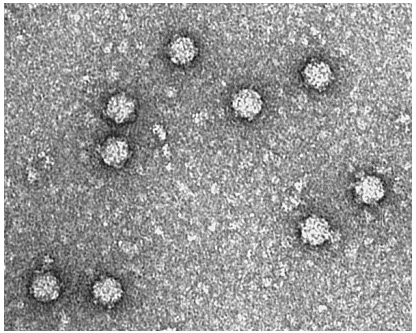
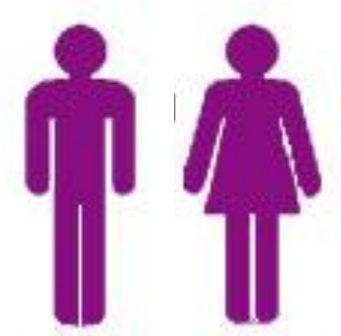


Image Courtesy of : https://www.sciencephoto.com/media/211270/view/supercomputers-at-celera-dna-sequencing

Evolution: Genome Size α Computing Power



Phi X 174 (1977)



H. Sapiens (2001)

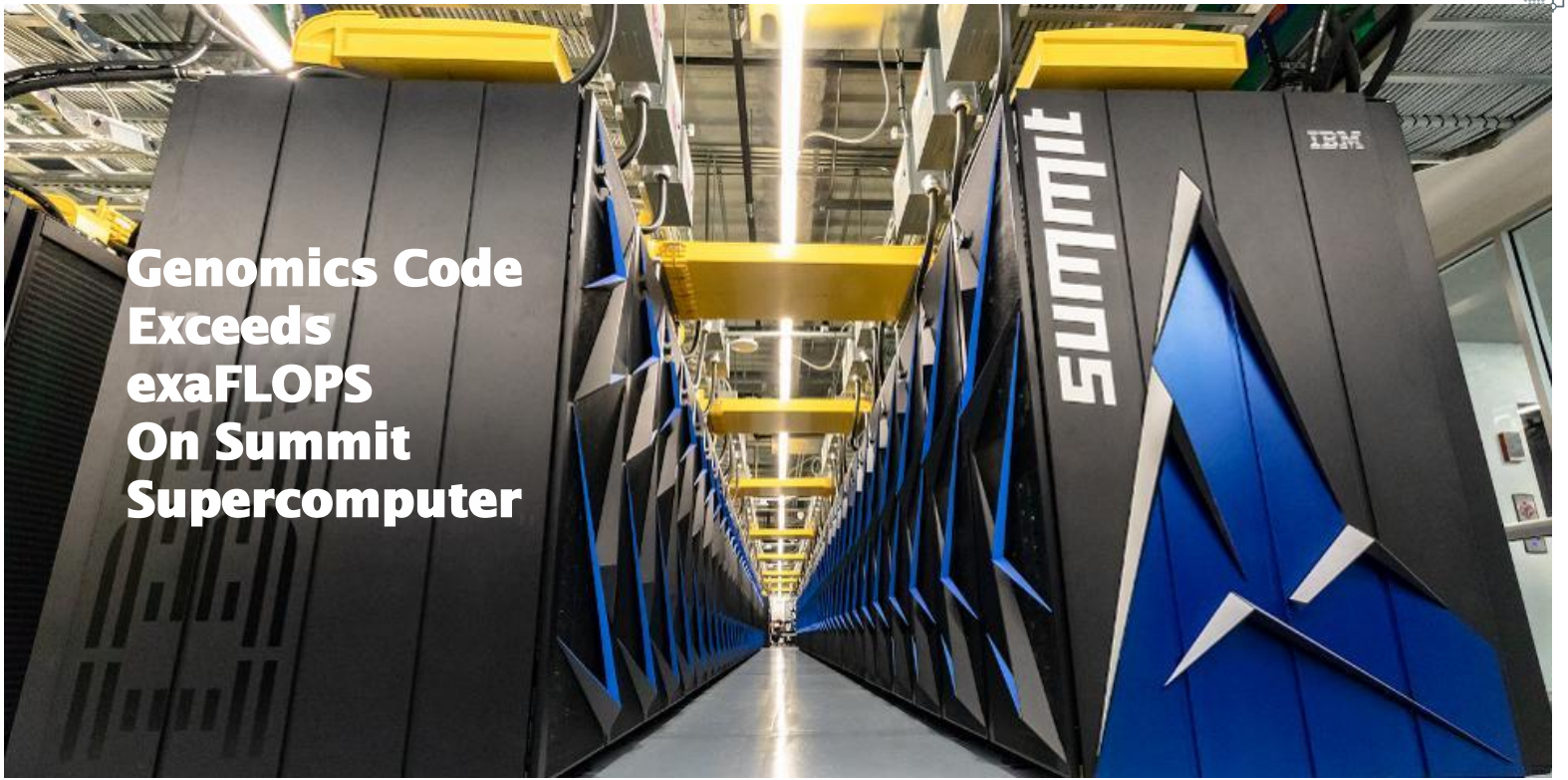
Ambystoma mexicanum (2018)

Reference: Nowoshilow , et.al (2018). https://www.nature.com/articles/nature25458

International Human Genome Sequencing Consortium (2001). https://www.nature.com/articles/35057062

Sanger , et.al (1977). https://www.nature.com/articles/265687a0

Evolution: exaFLOPS



Reference : Jonthan Hines (2018). https://www.olcf.ornl.gov/2018/06/08/genomics-code-exceeds-exaops-on-summit-supercomputer/

Current Research Areas in Genomics

NeSI
New Zealand eScience Infrastructure

1. Conservation
   - Earth BioGenome Project

2. Precision Medicine
   - Deep Genomics Inc (Targeted Cancer Drugs)
   - 100,000 Genomes Project
   - Deepmind Health (NHS)

Conservation : Earth BioGenome Project

"A GRAND CHALLENGE

The Earth BioGenome Project (EBP), a moonshot for biology, aims to sequence, catalog and characterize the genomes of all of Earth's eukaryotic biodiversity over a period of ten years. "

Reference : https://www.earthbiogenome.org/

Precision Medicine: Deep Genomics Inc.

AI-Powered Discovery Platform

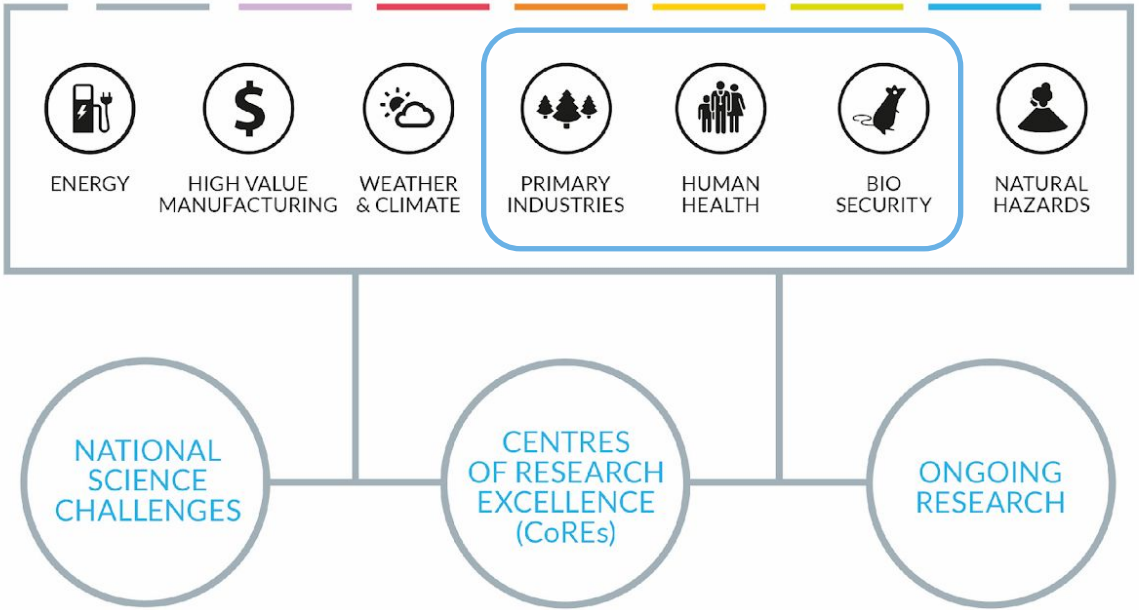
The future of medicine will rely on artificial intelligence, because biology is too complex for humans to understand

Our AI platform rapidly directs us to the best drug candidates. It knows cell biology, right down to the level of DNA, RNA and the molecular machinery of the cell. Everyone at Deep Genomics uses the platform to do their work, and everyone participates in improving the platform. That includes our geneticists, biologists, chemists, toxicologists and drug developers. Now, we're creating new oligonucleotide therapies, designed up front to be effective and safe.

Reference : https://www.deepgenomics.com

NeSI & Genomics

Computing capability for future prosperity



NeSI & Genomics

genomics aotearoa

LIC®

MASSEY UNIVERSITY

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

agresearch
āta mātai, mātai whetū

Plant & Food RESEARCH
RANGAHAU AHUMARA KAI

Manaaki Whenua
Landcare Research

E/S/R
Science for Communities

Ministry for Primary Industries
Manatū Ahu Matua

- Access to NeSI's *specialized* HPC platform
- Tailored Software and Data Management Services
- Skills Training in Computational Research tools and approaches

NeSI: Serving the needs of Bioinformatics & Computational Biology

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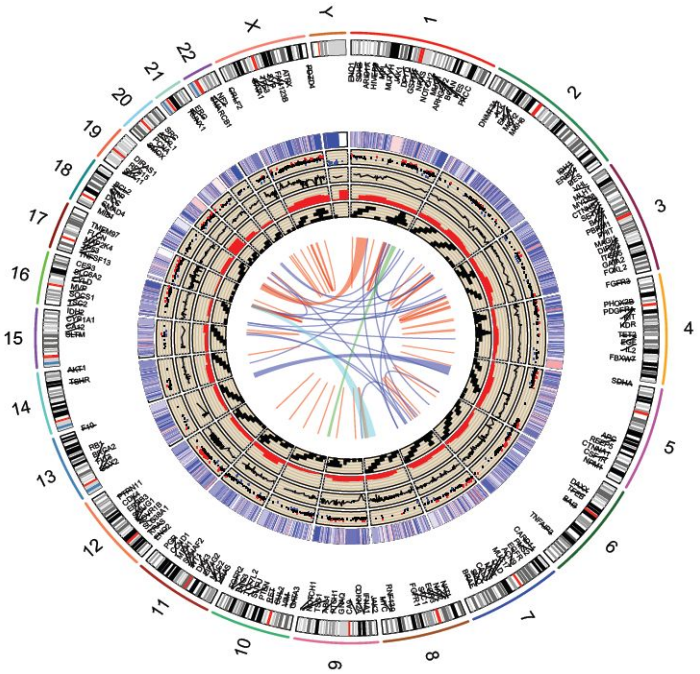

More Information :NeSI @ eResearch NZ - Talks & Workshops:

Tuesday 19 Feb

11:00 - 11:20 am - The NeSI HPC Compute and Data Analytics Service

11:00 am - 12:30 pm - Open Space Session - BYO topics!

11:20 am - 11:40 am - Deploying a Globus endpoint in an NZ institution

1:30 - 1:50 pm - Visualization capabilities of NeSI's new high performance computers

1:30 - 1:50 pm - A day in the life of NeSI's Apps Support

1:50 - 2:10 pm - NeSI and your data: Scalable storage

1:50 - 2:10 pm - Research Software Engineering (RSE): What's in a name?

Tuesday 19 Feb (cont.)

2:10 - 2:30 pm - Kicking On: Scaling new data services at NeSI

2:30 - 2:50 pm - Insight into the new NeSI platforms

3:30 - 4:30 pm - (Inter)national collaborative research infrastructure strategies BoF

3:30 - 4:30 pm - Research Software Engineering BoF

4:30 - 5:30 pm - Research Cloud NZ BoF

Wednesday 20 Feb

11:10 am - 4:00 pm - Hacky Hour / Bring Your Own Code Workshop