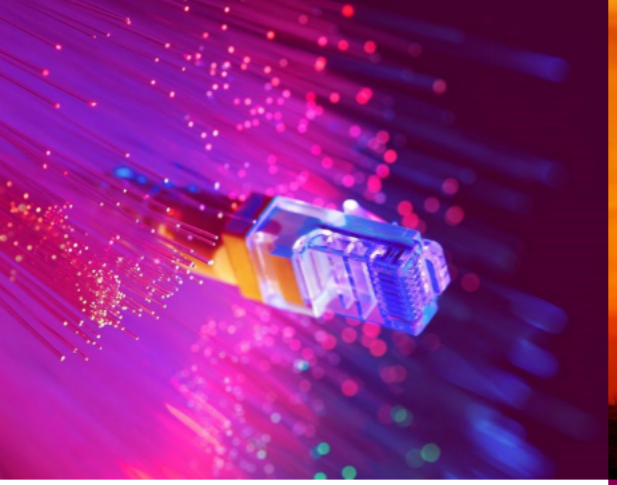


Earth Observation @ CSC

Storage and computing services

Samantha Wittke (CSC), 16.05.2022

CSC – Finnish expertise in ICT for research, education and public administration

CSC

- non-profit state enterprise with special tasks
- owned by Finnish state (70%) and higher education institutions (30%)
- headquaters in Keilaniemi, Espoo
- side offices and supercomputers in Kajaani

CSC services

research.csc.fi/en/service-catalog

Compute & Analyze

- cPouta / ePouta
- Puhti / Mahti / LUMI
- CSC Notebooks
- Rahti

+ Sensitive Data (SD) services

Store, Share & Publish Data

- Allas
- EUDAT
- IDA
- Paituli

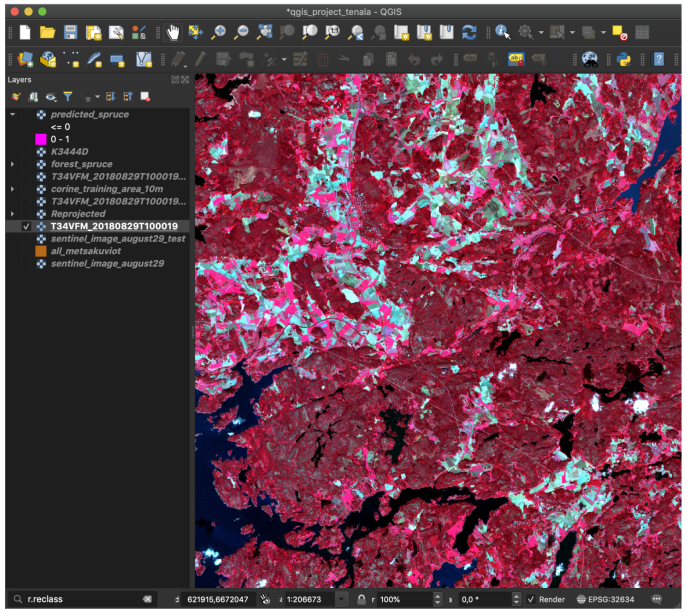
Storing EO data

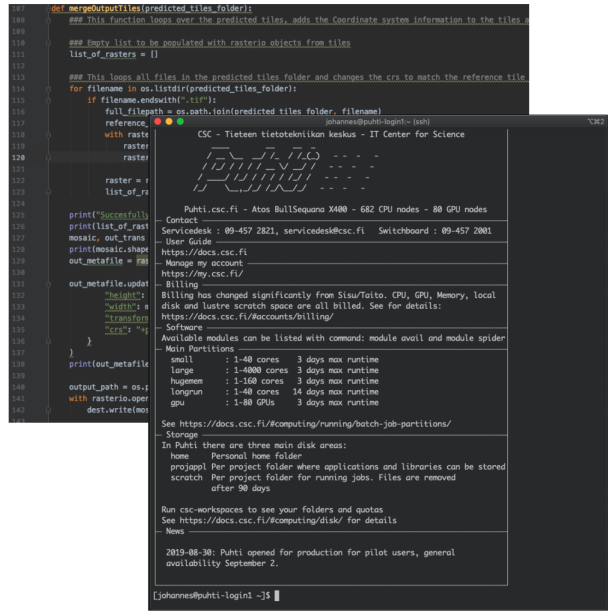
Allas object storage

- during project lifetime
- CSC account and project required
- access from other services and own computer
- some tools can read directly from Allas
- data is immutable
- Maximum size for free: **200TB**

Allas and Geospatial data webinar

Key to efficient geocomputing





Mac OS Microsoft Windows Linux

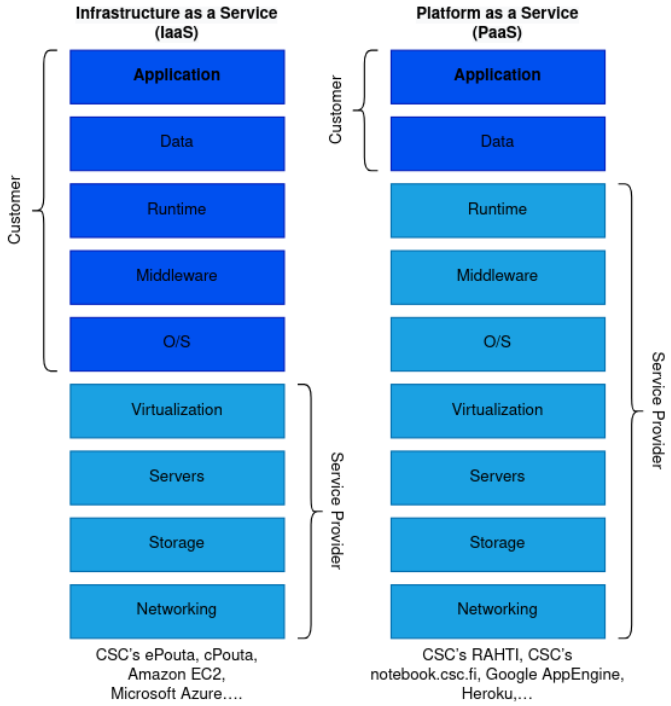
Linux

EO data processing and analysis

	Puhti	cPouta cloud
System	Supercomputer	Virtual machine cloud
Software	Pre-installed software + user-installed software	User-installed software
Data	Main Finnish datasets	-
Use cases	Run demanding analyses with numerous CPUs or GPUs	Setup your own virtual machine and environment
Max per job / VM / container	**4000** CPUs / **80** GPUs **1500**GB memory	**48** CPUs / **4** GPUs **240**GB memory

Pouta cloud

- Virtual Machines
- available on demand
- under own administration
- ideal for webserver / databases



Why use Puhti?

When own computer is not enough:

- Resource needs (time (> 2 hours), memory (> 8 GB), storage (> 50GB))
- prebuilt environments
- parallelization
- data availability (Paituli)

-> Outsource heavy computations, keep own computer free

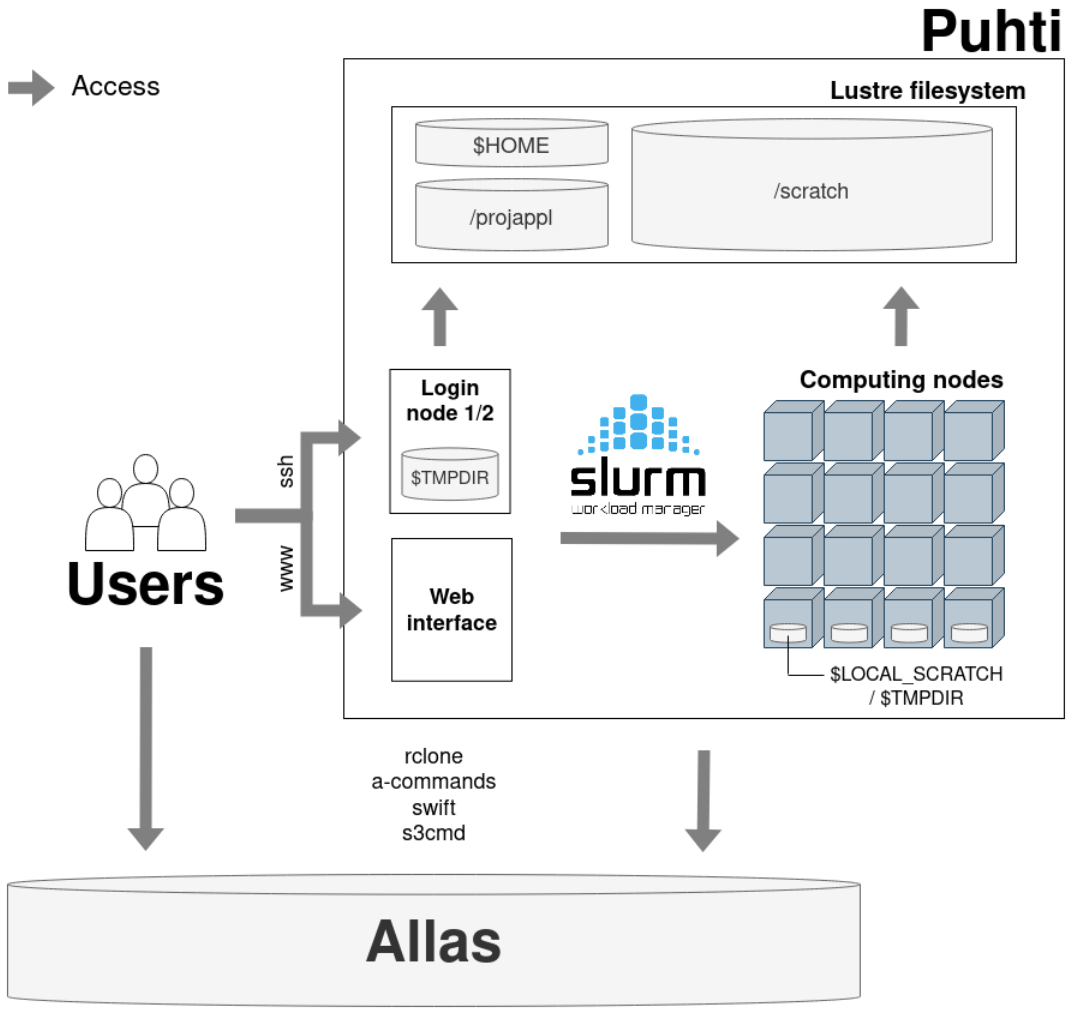
It's **free**! (for open science at Finnish higher education and state research institutes)

Puhti supercomputer

Main differences to laptop:

- memory and CPU(/GPU) availability (software needs to make use of this!)
- non-interactive
- resource knowledge

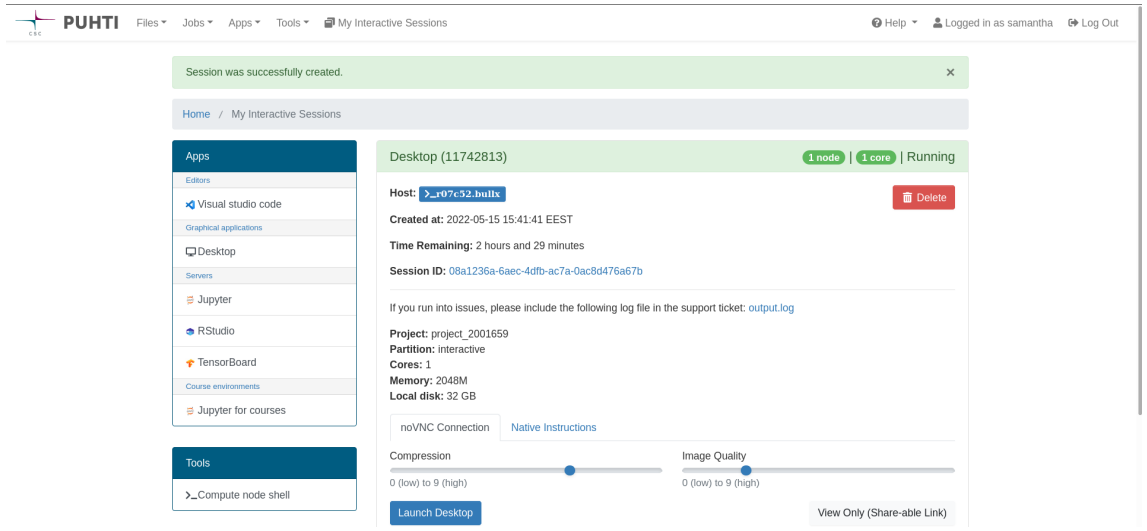
Computing solutions - Puhti



Puhti webinterface

-> check your data, testing, code development, file management, quotas, apps

puhti.csc.fi



Software

List of Applications in Docs

- **FORCE & SPLITS**
- **GDAL / OGR**
- LasTools
- MatLab / Octave
- Mapnik
- OpenDroneMap
- **OrfeoToolbox**
- PCL
- PDAL
- CloudCompare
- **QGIS**
- SagaGIS
- **SNAP, Sen2cor**
- **WhiteboxTools**
- Zonation
- ...

Python

Geoconda

- about 600 packages
- for raster, vector, pointcloud processing
- + scikit and other data science packages

other modules:

- Deep learning: tensorflow, pytorch -> have geopandas, rasterio

R environment on Puhti

- R and RStudio Server
- 1300+ R packages
- Pre-installed libraries / software required by R packages
- Mathematics library for faster calculations (Intel® OneMKL)
- TensorFlow (for using the R Interface to Tensorflow)

Data

almost all data from Paituli on Puhti +

- SYKE open datasets
- LUKE Multi-source national forest inventory
- NLS Virtual rasters for DEMs

-> '/appl/data/geo'

Sentinel-2 L2A (agricultural Finland, 2016-2021)

-> Allas

List of Geoscience data sets available from CSC computing environment

What data would you be interested to have available on Puhti/Allas?

-> www.menti.com; 2773 8461

Common EO challenges

- many tiles, same process -> "embarassingly parallel" -> Array jobs
- huge "dataframes" -> dask(Python)/future(R)
- data transfer -> Allas

Get access

Step by step instructions

- Account
- Project
- Resources
- Services
- Find your account and project information
- Read the docs
- check our tutorials and geocomputing examples

CSC expertise

...at your fingertips:

`docs.csc.fi`

`research.csc.fi`

+ servicedesk@csc.fi

- Geoinformatics team
- Data analytics and AI team
- Storage team
- Supercomputer team
- Cloudcomputing team
- Accounts team
- ...

How we can help

Speed up your request

- 'Z is not working as expected'
- 'my code gives error Y '
- 'can A be installed to Puhti?'
- 'any advice how to do X?'
- training/example wishes

-> servicedesk@csc.fi

- Setting up pipelines, product provision, R&D, ...

-> CSC as project partner / subcontractor

How you can help

If you used any of our resources for your research, please acknowledge CSC and Geoportti in your publications, it is important for project continuation and funding reports. As an example, you can write:

"The authors wish to thank CSC - IT Center for Science, Finland (urn:nbn:fi:research-infras-2016072531) and the Open Geospatial Information Infrastructure for Research (Geoportti, urn:nbn:fi:research-infras-2016072513) for computational resources and support".

Training

- 'Using CSC environment efficiently' course
- 18.05: Webinar - CSC´s generic services for storing, sharing and publishing data
- 09.-10.06: Fundamentals of Machine Learning
- CSC geoinformatics training material

-> follow our training calendar

Summary

Puhti is an excellent tool if you

- need more computing power
- don’t want to run long analyses on your personal computer
- have a lot of data
- are using data provided on Puhti/Allas in large quantities
- are willing to use scripts and have some basic Linux skills
- are willing to learn to use Puhti

Pouta is an excellent tool if you

- want to use databases and web-/mapservices
- have linux server administration skills

Earth Observation Data Information extractor

Preprint, Gitlab, Docs

EODIE is a toolkit to extract object based timeseries information from Earth Observation data.

- objects as polygons
- timeframe of interest
- features (eg vegetation indices) -> per polygon timeseries of the selected features over the timeframe of interest