Carbon-aware computing

Computing is responsible for a significant proportion of green house gas emission world wide. This includes emissions related to on-site operation, operational costs related to energy usage from the grid and embodied emissions in the hardware and infrastructure required for the provision of IT related services.

Carbon emissions can be reduced through various means, for example the development of more efficient implementations of software, or executing the software when the energy is more green.

Bioinformatics is a significant user of High-Performance Computing (HPC) infrastructure and hence a significant user of electricity. While a heavy user of such infrastructure many of the tasks may not be so time-critical, unlike clinical applications which should be available on demand. This means they can be shifted in time and scheduled when the energy is 'greener'.

This topic allows for many possible projects, for example, estimating the potential for carbon estimation in popular bioinformatics pipelines, train deep learning models more efficiently, or how to schedule tasks in an environment-aware manner.