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Computational methods will transform both biological science and clinical practice over the next decades. Dramatic increases in the quantities of experimental, clinical, and other data, and in our ability to federate data from many sources, are enabling powerful computational approaches such as the mining and integration of data from huge databases in search of novel patterns and correlations. Rapid advances in both computer power and numerical methods enable the use of computational modeling and simulation to study previously inaccessible phenomena at the molecular, cellular, anatomical, and population levels. This marriage of modern biological and medical research with the computational sciences is destined to capture new levels of biological complexity that will motivate new theory, unearth novel biological concepts, and ultimately, drive new diagnostic strategies and treatment approaches.

This keynote is given by Ian Foster, who is known as the “father of grid computing”. He is currently The Arthur Holly Compton Distinguished Service Professor of Computer Science, Director of the Computation Institute, and Argonne Distinguished Fellow at The University of Chicago and Argonne National Laboratory. Foster has received the Lovelace Medal of the British Computer Society, the Gordon Bell Prize for high-performance supercomputing, and is a fellow of the American Association for the Advancement of Science.