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Experience Learned from Initial Scale-Out Prototyping Efforts

As observed by computer scientists in SKA science data processor (SDP) consortium, the designed capability of scientific data processing is significantly reduced in the current design of SDP by focusing only on high-priority scientific observation tasks, and reducing the number of effective baselines of the antenna. SDP consortium reduced the sustainable requirement of imaging computation for scientific data processing to 25 PFlops. Under the assumption of 10% computational efficiency, the peak performance requirement is 260 PFlops and the computational power consumption is 4.3 MW. However, as the existing design basically refers to the general purpose computer designs, e.g. Tianhe 2 and other supercomputing centres, features of SKA SDP were not fully considered in the current design. There seems no sufficient effort in research on SKA SDP design in full scale under the constraints of computing, data movements, storage and power efficiency. Simple application goal adjustment in current design only temporarily avoids the limitation of budget reduction, and does not technically solve the bottleneck of large-scale computing and data transmission of SKA scientific data processing. Similar to the situation of existing SKA SDP design, some bottlenecks in FAST telescope, a SKA pathfinder project were found during the actual operation of the FAST telescope, e.g. the actual amount of observation data was several orders of magnitude larger than earlier model. As such, we have to handle the challenges by working on scale-out prototyping to compose a SKA-SDP application specific system. Experience Learned from Initial Scale-Out Prototyping Efforts are summarised in the talk in the areas of computing hardware platform, system software framework, data processing as well as operational scheduling.

Suggested duration

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