

## From Supercomputing to Cluster Computing to Grid Computing to Cloud Computing – Challenges and Solutions

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### **Abstract:**

Cloud computing has emerged rapidly as a growing paradigm of on-demand access to computing, data and software utilities using a usage-based billing model. Users essentially rent resources and pay for what they use and everything including software, platform, and infrastructure is as a service. Cloud computing overlaps some of the concepts of cluster, distributed, grid, service, ubiquitous, utility and virtual computing; However it outgrows from these computing domains and has its own meaning now. Many mature technologies used in other computing models are also employed as components in cloud computing. Clearly, there are still many unresolved and open problems due to its unique characteristics which are different from supercomputing, cluster computing, grid computing, utility computing and service computing. In this talk, I will give a review of supercomputing, cluster computing, grid computing and cloud computing. Since the first supercomputer was developed 40 years ago, there have been many technological changes and many programming models developed. Hence, a review of technologies and approaches used in supercomputing, cluster computing, grid computing will be helpful for us to identify issues and approaches in cloud computing. Comparisons of these computing domains, their limitations and potential solutions will be included in this talk.

### **Biography:**

Dr. Yi Pan is the chair and a professor in the Department of Computer Science, and a professor in the Department of Computer Information Systems at Georgia State University. Dr. Pan received his B.Eng. and M.Eng. degrees in computer engineering from Tsinghua University, China, in 1982 and 1984, respectively, and his Ph.D. degree in computer science from the University of Pittsburgh, USA, in 1991.

Dr. Pan's research interests include parallel and distributed computing, optical networks, wireless networks, and bioinformatics. He has published more than 100 journal papers with 40 papers published in various IEEE journals. In addition, he has published over 100 papers in refereed conferences. He has also co-authored/co-edited 34 books (including proceedings) and contributed several book chapters. His pioneer work on computing using reconfigurable optical buses has inspired extensive subsequent work by many researchers, and his research results have been cited by more than 100 researchers worldwide in books, theses, journal and conference papers. He is a co-inventor of three U.S. patents (pending) and 5 provisional patents, and has received many awards from agencies such as NSF, AFOSR, JSPS, IISF and Mellon Foundation. His recent research has been supported by NSF, NIH, NSFC, AFOSR, AFRL, JSPS, IISF and the states of Georgia and Ohio. Dr. Pan has served as an editor-in-chief or editorial board member for 15 journals including 5 IEEE Transactions and a guest editor for 10 special issues for 9 journals including 2 IEEE Transactions.

Dr. Pan has delivered many keynote speeches at international conferences. He is an IEEE Distinguished Speaker (2000-2002), a Yamacraw Distinguished Speaker (2002), a Shell Oil Colloquium Speaker (2002), and a senior member of IEEE.