Information Centric Networking: Technologies and Applications

TGI Course,
Dept. of Computer Science,
University College Cork

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TGI Module Code: TGI_N12

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Abstract

Information Centric Networks provide substantial flexibility for users to obtain information without regard to the source of the information or its current location. This change from a *host-centric* (typical of IP networks) to a *information-centric* capability removes the need for senders and receivers to know and establish context with specific nodes that are producers or consumers of information. ICN provides the ability to communicate between names. The communication path can be dynamically bound to any of a number of end-points, and the end-points (both source and destination) could change as needed, thus enabling mobility. Named Data Networking (NDN) (and Content Centric Networking (CCN) which is similar to NDN) is one popular ICN approach. Another is MobilityFirst. Both are part of the US NSF Future Internet Architecture program. This course will provide an introduction to the architectural approaches for NDN and MobilityFirst. The course will also describe Content-Oriented Pub/Sub System (COPSS) to achieve an efficient pub/sub capability for ICN.

The course will then examine applications of ICN. We will discuss the use of COPSS to support Multi-player Online Games. We will also discuss the use of ICN for Disaster Management. One of the characteristics of a disaster is that in the immediate aftermath of a natural disaster, network infrastructures likely suffer severe damage posing challenges to support normal communications. The traditional approaches to provide critical information are likely to be disrupted, thus requiring alternative means for providing timely information. The capability to exchange simple and critical messages in a timely manner with large portions of the affected population, including first-responders and government authorities is key to disaster management.

The course will finally examine the role of Object Resolution Systems that that addresses an important component – that of obtaining a name in ICN. Object resolution is an

application layer service that allows for the service diversity by separating the name space management from resolution service

Course Outline:

- Introduction to Information Centric Networks
  - Named Data Networking
  - MobilityFirst
  - Pub/Sub with COPSS
- Applications of ICN
  - Multi-player Online Games
  - Disaster Management
- Role of Object Resolution Services in ICN

Biography:

Dr. K. K. Ramakrishnan is a Professor of Computer Science and Engineering at the University of California, Riverside. Until the end of 2013 he was a Distinguished Member of Technical Staff at AT&T Labs-Research, starting at AT&T Bell Labs in 1994 and was with AT&T Labs-Research since its inception in 1996. Prior to 1994, he was a Technical Director and Consulting Engineer in Networking at Digital Equipment Corporation. Between 2000 and 2002, he was at TeraOptic Networks, Inc., as Founder and Vice President.

Dr. Ramakrishnan is an IEEE Fellow and an AT&T Fellow. His work on the "DECbit" congestion avoidance protocol received the ACM Sigcomm Test of Time Paper Award in 2006. He received the AT&T Technology Medal in 2013. He has published over 200 papers and has 152 patents issued in his name. K.K. has been on the editorial board of several journals and has served as the TPC Chair and General Chair for several networking conferences. K. K. received his MS from the Indian Institute of Science (1978), MS (1981) and Ph.D. (1983) in Computer Science from the University of Maryland, College Park, USA.

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