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***CSX454 Distributed Event Based Systems***

**L-T-P: 3-0-0-3**

**Pre-requisites:** Distributed Systems/Distributed System Design

**Course Overview:**

Thepurpose of this course is to cover basic concepts of distributed event-based systems (particularly, core principles and practices in functioning of such event-based systems) and their applicability in contemporary event-processing systems.

**Course Outcomes:** After completing this course, students should be able to:

* *cite* different applicability approaches of distributed event-based systems in reality;
* *discuss* fundamental concepts for functioning of distributed event-based systems;
* *solve* qualitative/quantitative problems on design principles of distributed event-based systems.
* *determine* functional and nonfunctional characteristics of architectural elements and patterns of distributed event-based systems.

**Course Outcomes: Cognitive Levels–Program Outcomes Matrix –  
[S: Strong relation (3); M: Moderate relation (2); W: Weak relation (1); N: No relation (0)]**

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| **Course Outcomes** | **Cognitive Levels** | **Program Outcomes** | | | | | | | | | | | |
| PO-1 (Engineering knowledge) | PO-2 (Problem analysis) | PO-3 (Design/development of solutions) | PO-4 (Conduct investigations of complex problems) | PO-5 (Modern tool usage) | PO-6 (The engineer and society) | PO-7 (Environment and sustainability) | PO-8 (Ethics) | PO-9 (Individual and team work) | PO-10 (Communication) | PO-11 (Project management and finance) | PO-12 (Life-long learning) |
| CO-1 | Knowledge | S | S | S | S | W | W | M | W | M | S | W | S |
| CO-2 | Comprehension | S | S | S | S | W | W | S | M | M | S | W | S |
| CO-3 | Application | S | S | S | S | M | M | S | S | M | S | M | S |
| CO-4 | Analysis | S | S | S | S | W | M | M | S | M | S | M | S |

**Unit I: Lectures: 11**

**Introduction:** Event-based systems and different application scenarios; Evolution of event-based systems.

**Distributed event-based systems (DEBS):** Event, subscription and notification service; Interaction models; Notification filtering mechanisms; Distributed notification service.

**Unit II : Lectures: 10**

**Matching:** Content-based data and filter models; Matching algorithms: brute force, counting best, decision trees, binary decision diagrams, XML-based matching.

**Routing:** Routing models; Content-based routing algorithms: flooding, identity-based, covering-based, merging-based.

**Unit III: Lectures: 12**

**DEBS design:** Event-based components; Publish/subscribe functionality; Patterns, idioms and emitting notification.

**Scoping:** Cooperation control; Scope visibility; Dynamic scopes, attributes and abstract scopes; Notification duplication and dissemination; Notification mapping; Scope architecture and interface.

**Composite events:** Composite events; Composite event detection architectures; Composite events with scoping.

**Unit IV: Lectures: 9**

**DEBS case studies:** Case studies of contemporary DEBS, like CORBA, JINI, JMS, Gryphon, IBM WebSphere MQ etc.

**Text/Reference Books:**

* *Distributed event-based systems*.Gero Mühl, Ludger Fiege and Peter Pietzuch. Springer Science & Business Media, 2006.
* *Reasoning in Event-Based Distributed Systems.*Sven Helmer, Alexandra Poulovassilis and Fatos Xhafa, Springer Publishing Company, 2013.
* *Principles and Applications of Distributed Event-Based Systems.*Annika M. Hinze, Willie van Peer, Sonia Zyngier and Vander Viana, IGI Publishing Hershey, 2010.
* Jon Siegel, *Quick CORBA 3*, John Wiley & Sons, 2001.
* *Jini Technology: An Overview*.Ilango Kumaran and S. Ilango Kumaran, Prentice Hall, 2001.
* *Enterprise Messaging Using JMS and IBM Websphere.*Kareem Yusuf, Prentice Hall, 2004.
* *WebSphere MQ Primer: An Introduction to Messaging and WebSphere MQ.*Mark E. Taylor, IBM Redbooks, 2012.