CSE530: Distributed Systems Concepts and Design: Lectures and Resources

S.no.	Topic	Lecture Notes/Slides	Reference Slides (without annotations)	Reading Material	Code Examples	Videos	Additional Reading [Not part of exams]
1.	**Administrivia**	Course Description	Slides				
2.	**Introduction to Distributed Systems**	Lecture 1 Notes		**DS Textbook: Section 1.2**			
3.	**Communication: Remote Procedure Calls**	Lecture 2 Notes	Slides [only slides 12-20]	**DS Textbook: Section 4.2**	**Textbook:** **Note 4.3 and 4.4** **Figure 4.8 and 4.9**	RPC Video	**RPC vs REST:** **Blog 1** **Blog 2**
4.	**Communication: gRPC, Sockets and ZeroMQ**	Lecture 3 Notes	Slides [only slides 23-30]	**DS Textbook: Section 4.3**	**Textbook:** **Note 4.7** **Figure 4.19** **gRPC**		
5.	**Communication: ZeroMQ and RabbitMQ**	Lecture 4 Notes	Slides [only slides 25-30 and 32-35]	**DS Textbook: Section 4.3**	ZeroMQ RabbitMQ ZeroMQ Docs RabbitMQ Docs		
6.	**Coordination: Physical Clocks, NTP and Logical Clocks**	Lecture 5 Notes	Slides [only slides 2-6 and 10-11]	**DS Textbook: Section 5.1 and 5.2**		**Physical Clock Video** **NTP Video** **Happens-Before Video**	
7.	**Coordination: Logical Clocks and Lamport's algorithm,** **Vector Clocks**	Lecture 6 Notes	Slides [only slides 10-21 and 25-29]	**DS Textbook: Section 5.2**		**Lamport Clocks and Vector Clocks**	
8.	**Coordination: Mutual Exclusion**	Lecture 7 Notes	Slides [only slides 34-37]	**DS Textbook: Section 5.3.1, 5.3.2, 5.3.3**			
9.	**Coordination: Leader Election and Apache Zookeeper**	Lecture 8 Notes	Slides [only slides 47-51]	**DS Textbook: Section 5.3.6, 5.4.1, 5.4.3**	**Textbook:** Note 5.6 and Figure 5.22		**Kafka and Zookeeper** **Leader Election and Locking using Zookeeper**
10.	**Consistency and Replication: Data-Centric Consistency Models**	Lecture 9	Lecture 9 [without annotations]	**DS Textbook: Section 7.1 and 7.2.1** **Medium Blog Post**			
11.	**Consistency and Replication: Data-Centric**	Lecture 10	Lecture 10 [without	**DS Textbook: Section 7.1 and 7.2.1**		**Sequential and causal**	

	Consistency Models [Strict, Linearizable and Sequential consistency]		annotations]			consistency Sequential Consistency Video 1	
12.	**Consistency and Replication: Data-Centric Consistency Models [Casual and Eventual Consistency]**	Lecture 11	Lecture 11 [without annotations]	DS Textbook: Section 7.2.1 and 7.2.2		Casual Consistency Video 1	
13.	**Consistency and Replication: Protocols for implementing sequential consistency**	Lecture 12	Lecture 12 [without annotations]	DS Textbook: Section 7.5.1 and 7.5.2		Sequential Consistency Protocols **[Start watching from 34:40. Ignore the earlier part.]**	
14.	**Hadoop Distributed File System (HDFS)**	Lecture 13	Lecture 13 [without annotations]	HDFS Paper		HDFS video	HDFS Architecture
15.	**MapReduce**	Lecture 14	Lecture 14 [without annotations]	MapReduce Paper MapReduce Notes			
16.	**MapReduce examples and Apache Spark [Recorded video]**	Lecture 15	NA			Make-up video	Apache Spark RDD Paper
17.	**Fault Tolerance: Introduction [Meet Recording]**	Lecture 16	NA	DS Textbook: Section 8.1		Google Meet Recording	
18.	**Consensus using Raft**	Lecture 17 Lecture 18 Lecture 19	Raft Slides	Raft Paper		Raft Video Visualization 1 Visualization 2	Raft website
19.	**Transactions and Concurrency Control: Two-phase commit**	Lecture 20	Lecture 20 [without annotations]	DS Textbook: Section 8.5		2PC video	
20.	**Recovering: Chandy-Lamport's Distributed Snapshots**	Lecture 21	Lecture 21 [without annotations]	Very good example Medium Blog Post DS Textbook: Section 8.6.1 and Section 8.6.2		UC Santa Cruz Lecture	Original paper
21.	**Peer-to-Peer Systems: BitTorrent**	Lecture 22	Lecture 22 [without annotations]	BitTorrent original paper			
22.	**Quiz 2 and Project discussion**	Lecture 23 Notes					

23.	**Blockchain**	Lecture 24	Lecture 24 [without annotations]	**Minimal working blockchain: Chapter 1** **Minimal working blockchain: Chapter 2**	**Code for Chapter 1** **Code for Chapter 2**		
24.	**Blockchain**	Video 1 Video 2 Video 3 Video 4 Video 5	No Slides for Lecture 25				**Full Playlist**