Lecture Title	Lecture Notes	Post Lecture Reading	Description - Topics covered
System Design 101 & Consistent Hashing	System Design 101 & Consistent Hashing	Load Balancer	Via the story of del.icio.us, introduce how a product which starts with one machine eventually would have to move to multiple machines (horizontal vs vertical scaling). Introduce the process of domain registration, DNS lookup / DNS servers. As you move to multiple machines, talk about the need of a load balancer. Take a segway to talk about load balancing when machines are stateless. Then, come back to what's the best way to shard data and route when machines store stuff and are hence stateful. Introduce consistent hashing.
System Design - Caching	System Design - Caching 1		Continue the story of del.icio.us. Talk about how keeping data and business logic at the same place is a bad idea. Introduce separate application server and storage layer. Also introduce caching. Key, value pair cache. But where all can caching be done - In Browser vs CDN vs local cache vs global cache. Take Scaler test data caching as a use case to talk about local cache and how to invalidate.
System Design - Caching contd.	System Design - Caching Contd..docx	Scaling with Redis - Eviction policies and cluster mo	Introduce global cache - modified/derived data. Example of FB news feed caching (Case study 1) Eviction algorithms - 2-3 examples in the form of a quiz. CDN deepdive. Multimedia caching. In browser caching deepdive. TTL.
System Design - CAP Theorem & Master Slave	System Design - CAP Theorem, PACELC Theorem &	Master Slave: MySQL	CAP theorem explained. PACELC also explained. Introduce replication. Master Slave. Talk about various cases with CAP in mind.
System Design - SQL vs NoSQL	System Design - SQL vs NoSQL		ACID transactions. How index works. Explain how sharding is manual and difficult with SQL databases. Step 1 of sharding: Choosing a sharding key. Principles/constraints of choosing a sharding key. 3-4 examples as quizzes around sharing key. Deep dive and explain the choices. Step 2 of sharding: Denormalize schema. Again, take 2-3 quiz examples. Step 3: Introduction to NoSQL fundamental with constraints.
System Design - NoSQL contd.	NoSQL Contd.		Introduction to Cassandra / DynamoDB architecture. Tunable consistency. Few quizzes on R+W cases. Disaster Recovery with Cassandra.
System Design - Case study 2 (Typeahead)	System Design - Case study 2 (Typeahead)		Google search typeahead case study. Process of a case study. Sampling. Time Decay.
System Design - NoSQL Internals	System Design - No SQL Internals		Discuss storage when schema is not defined. Immutable data types. Sorted sets. LSM Trees. Compaction process
System Design - Case study 3 (Messaging)	System Design - Case study 3 (Messaging)		Design FB Messenger. Sharding key choices of 1:1 vs group. High consistency. Write through local cache. Locking mechanism to avoid data corruption. Discuss notification service architecture.
System Design - Zookeeper + Kafka	System Design: Zookeeper + Kafka:	Kafka	Discuss architecture of Zookeeper and Messaging queues like Kafka and RabbitMQ
System Design - Case Study 4 (Elastic Search)	HLD Case Study 4 Elastic Search	1. https://www.youtube.com/watch?v=n9mE5MXGka 2. https://www.youtube.com/watch?v=ajNfOPeWiAY	Does SQL work for text search? How do you search for resumes using text inside? Would a NoSQL work. Introduce Apache Lucene, stemming, putting it on distributed system (ES)
System Design - S3 + Quad trees (nearest neighbors)	System Design - S3 + Quad trees (nearest neighbors) .docx		Design architecture of large file storage systems like S3. Post that, quick overview of the trickiest part of all location based apps. How to find nearest k neighbors. Introduce quad trees
System Design - Case Study 5 (Design Uber)	System Design - Case Study 5 (Design Uber).docx		Cabs move. How do you design nearest neighbor for moving targets.
System Design - Popular interview questions	System Design - Popular interview questions		1. Rate Limiter, 2. Unique ID generator, 3. Design Notification systems
System Design - Case Study 6 (Design Hotstar)	FAQ - Case Study - System Design of Hotstar .pdf		Hotstar - Thumbnail, different resolutions, broadcasting live video feed to millions of users at the same time
System Design - Microservices	System Design - Microservices 1	System Design - Microservices 2	Microservices vs Monolith. 2 case study examples. ECommerce Case study as an example.
System Design - Case study 7 (Design IRCTC)	Case study 7 (Design IRCTC)		How do you avoid double booking tickets in a high concurrency setup. How do you scale. How do you allow multi-booking of a seat across various source and destination