**Real-Time Analytics**

* It plays a vital role in detecting anomalies or patterns in data that might otherwise go unnoticed in traditional batch processing.
* Additionally, you'll learn about its significance in areas such as customer experience enhancement, fraud detection, and operational efficiency improvement.
* Real-time analytics is crucial because it enables organizations to gain a competitive edge by responding swiftly to changing market conditions.

**Data Sources**

* Sensors, smart appliances give temp readings, gps coordinates etc.
* Social media feeds
* Customer interactions
* Market Data
* Machine Data

**Data Collection and Ingestion**

* Collect through APIs, web scraping, device integration or manual input
* Many tools such as Apache Kafka that handles high volumes of data
* Data transformation
* Streaming is real-time data, while batch processing handles data in fixed batches.
* Scalability of a data collection system is important

**Data Storage**

* Stream processing frameworks (Apache Storm) allow you to process real-time data with operations like filtering, aggregating and joining.
* Data enrichment by merging data
* Time-based windows in stream processing.
* Complex event processing identify patterns and complex events in real-time data streams, valuable for anomalies.

**Data Storage**

* NoSQL like Cassandra or MongoDB
* Data Lakes are repositories for storing vast amounts of raw data.
* In-memory databases provide lightning-fast data retrieval, suitable for real-time data.
* Data retention policies and archiving strategies define how long data is stored and cost.
* Data security including encryption, access controls and compliance with regs.

**Analytic Tools**

* Tableau is a BI tool for dashboard creation
* Apache Spark Streaming is an extension to Apache Spark
* Elasticsearch is used in full-text search and real-time analytics for log events.

**Visualizing Real-Time Data**

* Consider the art of data storytelling to convey data in a narrative format to convey insights to stakeholders

**Challenges and Considerations**

* Data quality, scalability, latency, CEP, data security, privacy compliance, retention policies, cost management, monitoring and alerts, resource management ie CPU, Failover and redundancy.

**Future Trends**

* Blockchain for data security
* Augmented analytics automates data preparation, insight discovery, and natural language generation.
* Streaming data warehouses evolving to handle real-time data for the combination of historical and real-time for more insights.
* Real-time dashboards continue to evolve.
* Predictive Maintenance reducing downtime.