EXAMPLES OF DATA STREAM SOURCES /APPLICATIONS

- **Sensor Networks:** Sensor networks are a huge source of data occurring in streams. They are used in numerous situations that require constant monitoring of several variables, based on which important decisions are made. In many cases, alerts and alarms may be generated as a response to the information received from a series of sensors. To perform analysis, aggregation and joins needs to be performed. Some representative query includes the following:

    1. Perform a join of several data streams like temperature streams, ocean current streams etc at weather stations to give alerts or warnings of disasters like cyclones and tsunami.

- **Network Traffic Analysis:** Network service providers can constantly get information about Internet traffic, heavily used routes, etc. to identify and predict potential congestions. Streams of network traffic can also be analyzed to identify potential activities.

- 1) Check whether a current stream of actions over a time window are similar to a previous identified intrusion on the network.

- **Financial Applications:** Online analysis of stock prices and making hold or sell decisions requires quickly identifying correlations and fast changing trends and to an extent forecasting future valuations as data is constantly arriving from several like news, current stock movements etc. The following is the typical query:

    1. Find all stocks priced between Rs.500 to Rs.1000, which is showing very large buying in the last one hour based on some federal bank news about tax cuts for a particular industry.

- **Transaction Log Analysis:** Online mining of web usage logs, telephone call records and automated bank machine transactions are all examples of data streams since they continuously output data and are potentially infinite. The goals is to find interesting customer behavior patterns, identify suspicious spending behavior that could indicate fraud,. Example query: 1) Examining current buying pattern of users at a website and potentially plan advertising campaigns and recommendations.

Applications od Data Streaming

- **Mining query streams**

    - Google wants to know what queries are more frequent today than yesterday

- **Mining click streams**

    - Yahoo wants to know which of its pages are getting an unusual number of hits in the past hour

- **Mining social network news feeds**
    - E.g., look for trending topics on Twitter, Facebook
- **Sensor Networks**

    - Many sensors feeding into a central controller

- **Telephone call records**

    - Data feeds into customer bills as well as settlements between telephone companies

- **IP packets monitored at a switch**

    - Gather information for optimal routing

    - Detect denial-of-service attacks