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Week 4: Daily Morning Challenge

Day 1: Tuesday 14th January 2020

**Question 1: Use the table below to identify what scale of measurement (Nominal, Ordinal, Interval or Rank) best represents the data**

|  |  |
| --- | --- |
| **Data Set** | **Scale of Measurement** |
| Genotype | Nominal |
| Temperature | Interval |
| Socio-economic Status | Ordinal |
| Gender | Nominal |
| Income level | Ordinal |
| Credit Score | Interval |
| Race | Nominal |
| Satisfaction rating | Ordinal |
| Weight | Interval |
| Political party | Nominal |

**Question 2: What is the difference between Array, List and Dictionary data structures**

|  |  |  |
| --- | --- | --- |
| **ARRAY** | **DICTIONARY** | **LIST** |
| Items in array are accesed by position | Items are accesed by keys | Items are accessed by position |
| Provide random access of a sequential data | Provide a map to a set of keys to a set of values | Provide random access of a sequential data |
| Store a set of objects | Store pairs of object | Store pairs of objects |
| Allows both direct and sequential accesss | Allows direct access | Only sequential access is allowed |

**Question 3: Give a short overview of how database technology has evolved in the 21st century (more specifically as regards SQL vs NoSQL)**

Databases are essentially software applications. A database management system (DBMS) is the name of the software that provides data to other applications, allowing all the digital information systems that we interact with today. Often, a DBMS is referred to as a database. There are many vendors and software solutions with different licenses and uses. Data is shared with a variety of standards, but primarily they all serve the same purpose, which is to provide applications with data. The applications then process the data and turn it into something useful for the users: information.

**Early history of databases**

Before databases existed, everything had to be recorded on paper. We had lists, journals, ledgers and endless archives containing hundreds of thousands or even millions of records contained in filing cabinets. When it was necessary to access one of these records, finding and physically obtaining the record was a slow and laborious task. There were often problems ranging from misplaced records to fires that wiped out entire archives and destroyed the history of societies, organisations and governments. There were also security problems because physical access was often easy to gain.

In 1998, a new term was coined, namely NoSQL. It refers to “non SQL” databases that use other query languages to store and retrieve data. These types of databases have existed since the 1960s, but it was the Web 2.0 revolution that made them come to the attention of the technology world.

## Business intelligence

Computers have transformed the way businesses operate. In the past, decisions were made based on the experience of the most highly paid managers and executives. Databases have allowed companies to develop incredibly sophisticated enterprise resource systems (ERP) that gather data from every part of an organisation and store it all in a central database. Data is collected from factories, offices, remote workers, sensors and anywhere that useful and quantifiable data exists. Companies like Oracle and SAP provide solutions that can cost up to $15m for global organisations but which can save them up to 50% in operating costs (taken from the case study: Orange/France Telecom) thanks to improved efficiency and better forecasting.

Databases also allow organisations to work more effectively with their customers and suppliers. They augment workers, allowing them to do their jobs better and faster. They have also created the digital businesses we use every day, like Amazon and eBay.

Customer Relationship Management (CRM) systems allow organisations to build strong customer profiles from the moment they become a lead (i.e. when a customer first contacts an organisation). They allow for targeted marketing, better communication and are also becoming more connected with social media and other platforms that are commonly used for customer service and marketing.

Recently, Big data affects much more than just business and nuclear research. Police are using Big Data to analyse trends in crime using all the data they have from the past. They are combining this with information from social media, and they are using big data to predict when and where crimes and public disturbances will take place. Google is using searches to predict many things in society. Google Flu Trends used search analysis to predict where outbreaks of the flu virus would occur. They managed to accurately predict outbreaks two weeks before medical experts and traditional warning systems could. Big Data is also being used by meteorologists, seismologists and throughout science to analyse the past and see what the future is likely to hold.

Databases have come a long way since their creation in the 1960s. Initially, they were a solution to the problem of storing and protecting the things we wrote down and making it more accessible at a faster speed. Over time, they have become integral in our society, and we rely on them for banking, security, policing and in providing the services for our digital lives. For companies, business intelligence systems are helping to make more accurate decisions based on real facts, rather than guesswork based on experience. Big Data is helping us find new insights from the data we have generated in the past and will be vital in understanding the society of the future. Without databases, we would still be losing valuable information and the digital revolution would not have happened. The coming industrial revolution, also called Industry 4.0, will be driven by data, and it will transform the lives of every consumer and business in the world