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COMPONENTS OF GIS

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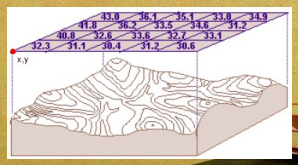
- Raster data model- In the raster data model, the earth is represented as a grid of equally sized cells. An individual cell represents a portion of the earth such as a square meter or a square mile.



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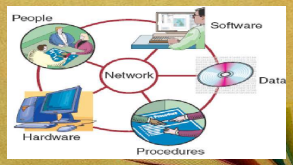
Components of GIS

Hardware
Software
Data
People
Network



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- Hardware- The computer or Central Processing Unit is the general hardware component of the GIS. It is attached to a disk drive storage unit, used for storing data and program.
- Software- the GIS software includes the programs and the user interface for driving the hardware. GIS software is essential to generate, store, analyse, manipulate and display geographic information or data.
- DATA- Geospatial data is like the blood of any GIS Components. Field workers, Drones, Satellites are used to collect geospatial data. The format of this data varies from tool to tool and depends upon the source from where the data is extracted. Primarily the geospatial data is classified into Raster data and Vector data.
- People- GIS technology is of limited value without the people who manage the system and develop plans for applying it to real world problems.
- NETWORK-Network allows rapid communication and sharing digital information. The internet has proven very popular as a vehicle for delivering GIS applications.

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Data Model

- A data model in geographic information systems is a mathematical construct for representing geographic objects or surfaces as data.

➢Vector Data Model

➢Raster Data Model

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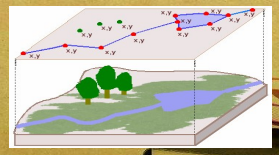
- Vector data model- The vector data model is based on the assumption that the earth's surface is composed of discrete objects such as trees, rivers, lakes, etc. Objects are represented as point, line, and polygon features with well-defined boundaries. Feature boundaries are defined by X,Y coordinate pairs, which reference a location in the real world.



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Spatial & Attribute Data

- Spatial data- Spatial data consists of points, lines, polygons or other geographic and geometric data primitives that we can map by location. It is possible to maintain spatial data as vector data or raster data. Each provides information connected to geographical locations.
- Attribute data- Attribute data are descriptions or measurements of geographic features in a map. It refers to detailed data that combines with spatial data. Attribute data helps to obtain the meaningful information of a map.

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Types of Attributes

- Nominal- A nominal scale describes a variable with categories that do not have a natural order or ranking. You can code nominal variables with numbers if you want, but the order is arbitrary. Example-(blood type, gender, eye colour etc.)
- Ordinal- An ordinal scale is one where the order matters but not the difference between values. Example-satisfaction rating ("extremely dislike", "dislike", "neutral", "like", "extremely like")
- Interval- An interval scale is one where there is order and the difference between two values is meaningful. Example- temperature (Fahrenheit), temperature (Celsius), pH
- Ratio-Ratio data tells us about the order of variables, the differences between them, and they have that absolute zero. Which allows all sorts of calculations and inferences to be performed and drawn. Example- pulse, weight, length.

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Geographical Data Formats

- Coverage- A coverage is a georelational data model that stores vector data—it contains both the spatial (location) and attribute (descriptive) data for geographic features. Coverages use a set of feature classes to represent geographic features. Each feature class stores a set of points, lines (arcs), polygons, or annotation (text). Coverages can have topology, which determines the relationships between features.
- Shape file- A shape file is a simple, no topological format for storing the geometric location and attribute information of geographic features. Geographic features in a shape file can be represented by points, lines, or polygons (areas). The workspace containing shape files may also contain dBase tables, which can store additional attributes that can be joined to a shape file's features.
- Geodatabase- A file geodatabase is a collection of files in a folder on disk that can store, query, and manage both spatial and non-spatial data. Spatial data: points, lines polygons, Non-spatial data: real world entities modeled as objects with properties, behavior, rules, and relationships.

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- Grid-A grid is a raster data storage format native to Esri. There are two types of grids: integer and floating point. Use integer grids to represent discrete data and floating-point grids to represent continuous data.
- .DXF- (Drawing Exchange Format) are vector files that use Cartesian coordinates. Every element plots XY points in a grid. DXF (Drawing Exchange Format) stores drawing information as exact representations of the data. But the purpose of DXF was for data exchange between CAD programs.
- .DWG- (from drawing) is a proprietary binary file format used for storing two- and three- dimensional design data and metadata. It is the native format for several CAD packages including DraftSight, AutoCAD. DWG are vector files that use Cartesian coordinates. Every element plots XY points in a grid.
- Geo-TIFF- files are raster image file types that are commonly used to store satellite and aerial imagery data, along with geographic metadata that describes the location in space of the image.
- GML- (Geography Mark-up Language) GML allows for the use of geographic coordinates extension of XML. And extensible Mark-up Language (XML) is both human-readable and machine-readable. GML stores geographic entities (features) in the form of text. GML can be updated in any text editor. Each feature has a list of properties, geometry (points, lines, curves, surfaces, and polygons), and spatial reference system.

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