

The background of the slide is a complex, abstract composition. It features a dark, reddish-brown base with a network of thin, light-colored lines forming a web-like structure. Scattered throughout are numerous small, colored dots in shades of green, blue, and orange. In the upper left corner, there is a smaller, lighter-colored rectangular area containing a grid of small, dark squares, some of which are highlighted in orange and red. The overall aesthetic is technical and data-driven.

Basic Concepts of Hierarchical Algorithms

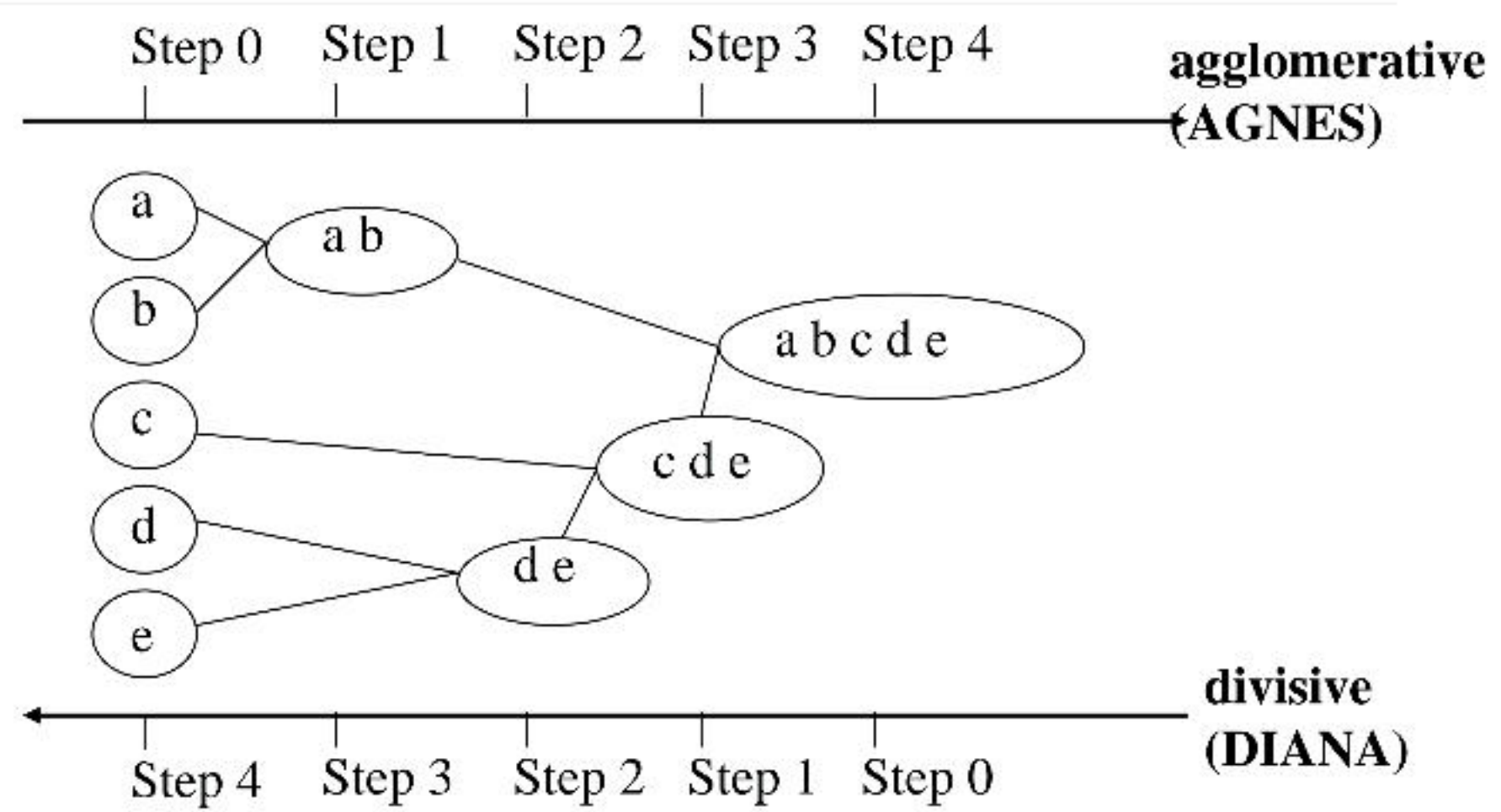
Hierarchical Clustering: Basic Concepts

■ Hierarchical clustering

- Generate a clustering hierarchy (drawn as a **dendrogram**)
- Not required to specify K , the number of clusters
- More deterministic
- No iterative refinement

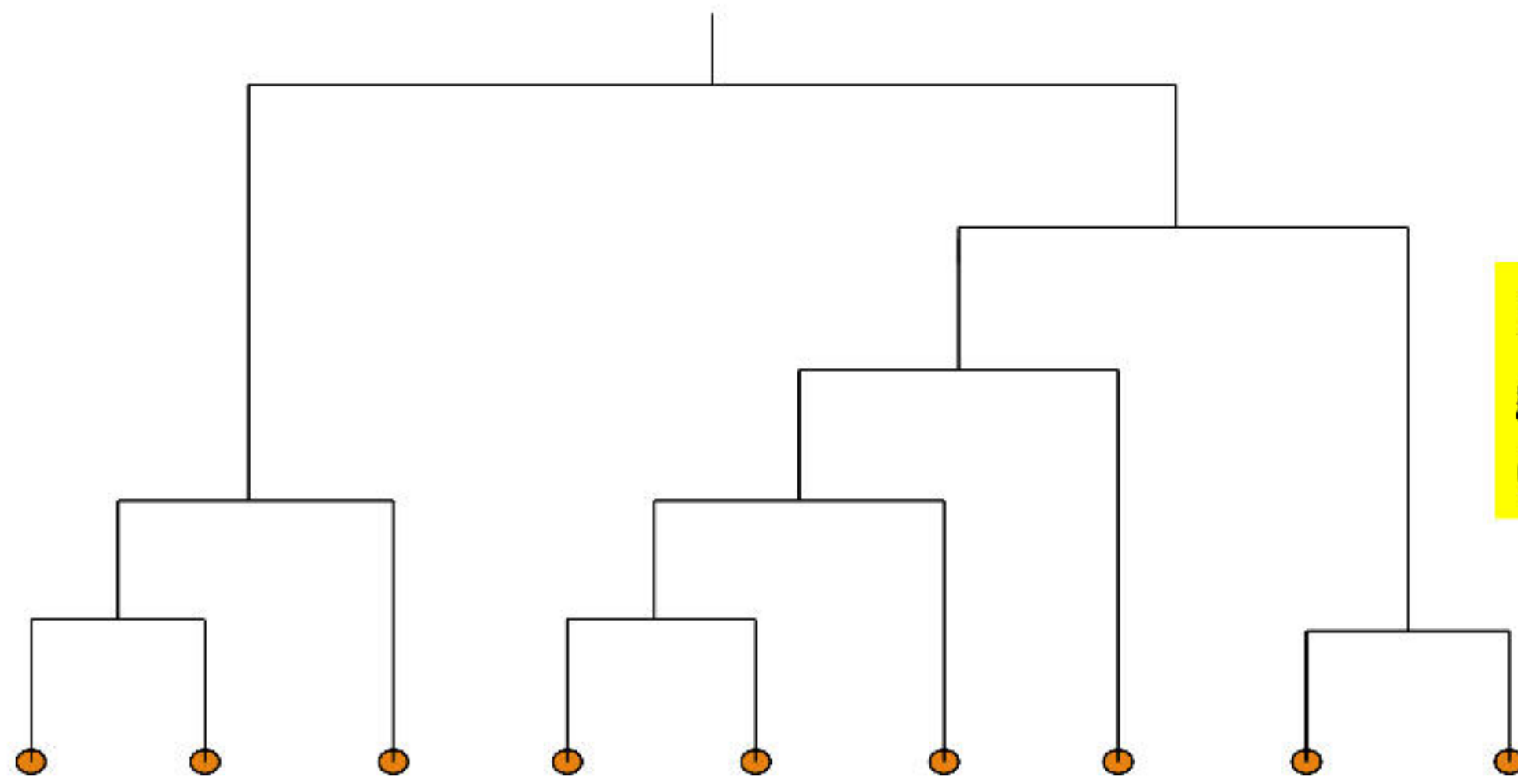
■ Two categories of algorithms:

- **Agglomerative:** Start with singleton clusters, continuously merge two clusters at a time to build a **bottom-up** hierarchy of clusters
- **Divisive:** Start with a huge macro-cluster, split it continuously into two groups, generating a **top-down** hierarchy of clusters



Dendrogram: Shows How Clusters are Merged

- ❑ Dendrogram: Decompose a set of data objects into a tree of clusters by multi-level nested partitioning
- ❑ A clustering of the data objects is obtained by cutting the dendrogram at the desired level, then each connected component forms a cluster



Hierarchical clustering generates a dendrogram (a hierarchy of clusters)