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**Rangkuman Algoritma dan Struktur Data**

**Chapter 13 – Connecting Everything with Graphs**

A graph is a data structure that represents relationships between entities, such as individuals in a social network. Nodes in a graph, called vertices, represent individuals, and edges represent connections or friendships between them. The implementation of a graph can vary, with one approach being the use of a hash table for simplicity. In a Ruby example, a social network's friendships are represented with a hash table, allowing for efficient lookups of an individual's friends. Additionally, the distinction between directed graphs, as seen in Twitter where relationships are one-directional, and non-directed graphs, as seen in Facebook with mutual friendships, highlights the flexibility of graph structures in modeling different types of relationships. LinkedIn's social network, with its second- and third-degree connections, introduces the need to traverse networks efficiently. Breadth-first search (BFS) is a classic algorithm for exploring a graph, enabling the discovery of a user's entire network, including indirect connections. BFS employs a queue to systematically process vertices, starting with the initial node, and it serves as one of the two fundamental methods, along with depth-first search, for graph traversal. Graph databases, designed specifically for handling relationships, offer superior performance compared to traditional relational databases when dealing with data structures like social networks, due to their inherent ability to efficiently model and query complex interconnections between entities. A weighted graph differs from a regular graph by incorporating additional information about the edges, typically assigning numerical values or weights to represent specific attributes or costs associated with the connections between vertices. Dijkstra's algorithm, devised by Edsger Dijkstra in 1959, is a notable solution to the shortest path problem in graph theory. The algorithm systematically identifies the shortest paths from a starting vertex to all other vertices in a graph by iteratively selecting the cheapest unvisited known vertex until all vertices have been visited.