Parallel Computing

Simone

UNIPD

DIPARTIMENTO
DI INGEGNERIA
DELL'INFORMAZIONE

Parallel Algorithms

Parallel sorting

Merge sort
Bitonic Merging
Bitonic Sorting

Prefix Computation

Binary Adder

forse?

FFT for Powers of Two

Benes Permutation

Network Definitions

Degree

In an undirected graph $G = (V, E)$, the **degree of a node** $a \in V$ is the number of its immediate neighbours, that is:

$$\text{degree}(a) = |\{b \in V : (a, b) \in E\}|$$

The **degree of a graph** is the maximum degree of any of its nodes, that is:

$$\text{degree}(G) = \max_{a \in V}(degree(a))$$

A graph is said to be **regular of degree** Δ if all its nodes have degree Δ

Diameter

In an undirected graph $G = (V, E)$, the distance $dist_G(a, b)$ between two nodes a and b is defined as the length of a shortest path in G from a to b. The **diameter of G** is defined as the maximum distance between any pair of nodes, that is:

$$\text{diam}(G) = \max_{a,b \in V}(dist_G(a, b))$$

Diameter and Degree Lower bound for any connected graph G with P nodes and $\text{degree}(G) = \delta \geq 3$:

$$\text{diam}(G) > \log_{\delta-1}(P - 1) + \log_{\delta-1}((\delta - 2)/\delta)$$

Bandwidth

Let $G = (V, E)$ be an undirected graph. Let $S \subseteq V$ be a subset of nodes. $\delta_G(S)$ is the number of edges between set S and its complement $V - S$

$$\delta_G(S) = |(S \times (V - S)) \cap E|$$

Dichotomy width Given m integer $0 \leq m \leq |V|$:

$$\delta_G(m) = \min_{S \subseteq V, |S|=m} \delta_G(S)$$

Bisection width Bisection width with $m = \lfloor |V|/2 \rfloor$:

$$b_G = \delta_G(\lfloor |V|/2 \rfloor)$$

Linear Array and Ring

Linear Array

Ring

Binary Hypercube

Binary Hypercube

Multidimensional Meshes and Tori

Embeddings and simulations

Altri blocchi di embedding specifiche

Tipo LA e H, H e M, M e LA presi anche da esami e soluzioni del prof oltre che dalle slide viste a lezione