计算机网络课程作业

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Task1:应用层——C/S与P2P通信

Server

Client

- **C/S通信实现要求：**
  - 两台计算机分别模拟服务器、客户端
  - 通过**Socket**编程实现服务器端、客户端程序
  - 服务器端程序监听客户端向服务器端发出的请求，并返回数据给客户端
  - 不采用**HTTP**方式，自定义通信协议，传输文件要足够大（例如：一个视频文件）

- 提示：
  - ◆ 通信前假设双方通过其他手段获得对方的**IP**地址、客户端知道服务器程序的运行端口

应用层——C/S与P2P通信(续)

Server

peer1　　peer2

peer3

- **P2P**通信实现要求：
  - 为每个**peer**开发服务器程序、客户端程序；
  - 每个**peer**上线后，向服务器注册自己的通信信息；
  - 假设**peer3**要下载文件**A**（视频），**peer1**与**peer2**都拥有**A**，请设计方案使**peer3**能够同时从**peer1**、**peer2**同时下载该文件，例如：从**peer1**下载**A**的前**50%**、同时从**peer2**下载后**50%**。
  - 比较**C/S**与**P2P**通信方式的性能指标
- 提示：

  - ◆ **Peer3**先去询问服务器，哪些节点有它需要的文件，获得**peer1**、**peer2**的通信信息
  - ◆ **peer3**向**peer1**、**peer2**请求所需要的文件片段
  - ◆ **Peer3**获得两个文件片段后重组成一个完整文件
- 拓展：在上述过程中，**peer1**同时向**peer2**、**peer3**请求文件

课程作业要求

- **Submit**
  - **PPTs + demo video**
  - **Source code (and the compiled executable files)**
  - **The project report documents (including introduction, design, setup and deploy, and result, project management records)**
  - **The individual report of each team members (your contributions, and anything else you want to talk about)**
  - **A list that shows each member's contribution and grade.**
  - **Put all file into a package and name it as:**
  A_B_C.rar,
  A: the student ID of group leader;
  B: the name of group leader;
  C: task1 or task2
  example: 1500001_张三_task1.rar
  - **Group leader submit it to the given FTP server,**
  - **Deadline: 2018.4.28**

课程作业要求(续)

- **Basic points**
  - **Protocol design. (10 points)**
  - **Finish basic function correctly (error). (60 points)**
  - **On time; (10 points)**
  - **Documents, codes, presentation; (20 points)**
  - **Votes;**
  - **in-group assessment.**

- **Task-2: virtual routing**
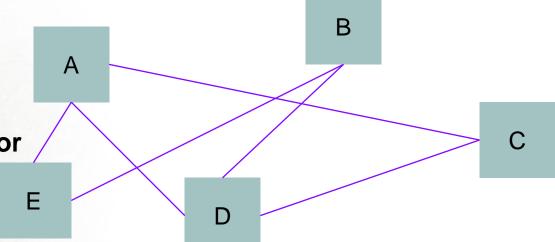
   (Application-layer routing)
  - **self-organized routing**
    - ◆ **Select a virtual topo for members' computers**
    - ◆ **Build virtual connection between computers according to the virtual topo, define the cost of links;**
    - ◆ **Each computer acts as both client and router.**
    - ◆ **Each computer exchanges and updates routing table periodically.**
    - ◆ **A computer can send message to other computers,**

  Hint:
  ➢**IP-in-IP (IP-layer virtual routing) or**
  ➢**use sock directly (Application-layer routing)**
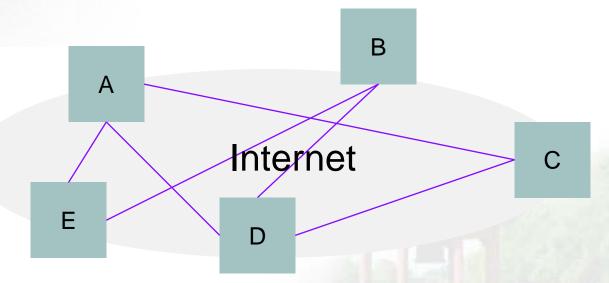 ➢**Use TCP or UDP**

Step 1:

- **Design the virtual topo (link cost)**
- **Each node has two ports for receiving and sending: Prt_I, Prt_O.**

Step 2:

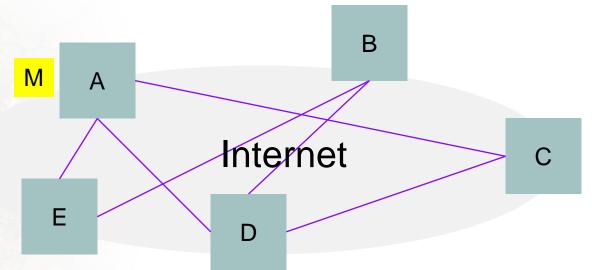**Build the virtual Topo over Internet, define the cost of links; exchange the routing information periodically**

Internet

Step 3:

Simulate the routing and forwarding. For example, **A sends M to B**. Which path is better?
A →E → B? or
A →D → B?
A → C → D → B?
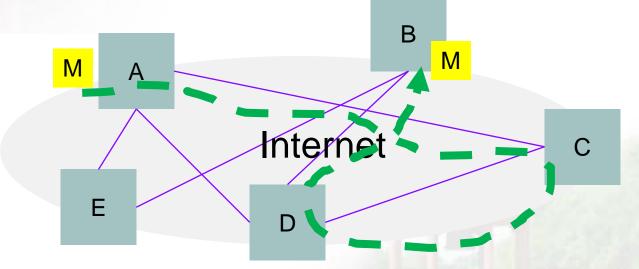
Step 4:
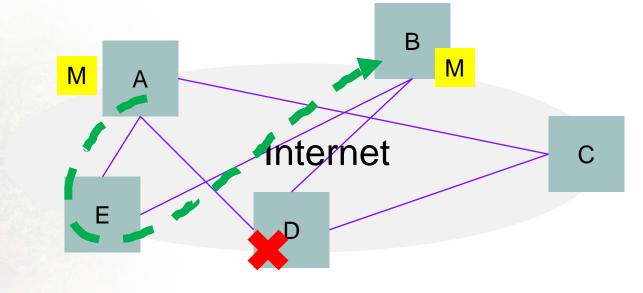
Transmit data M via the best path, e.g.,
A → C → D → B

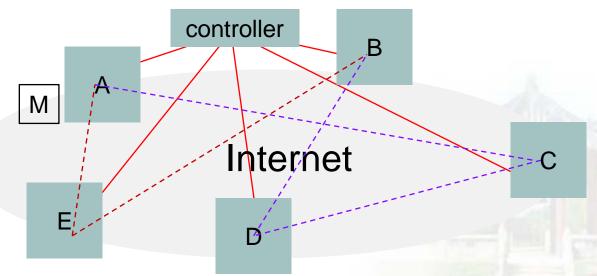# Step 5:

**A node is down.
e.g., D**

M A

B M

Internet

E

C

D

Please try different topo and different routing algorithms (LS & DV).

Task-2: virtual routing

centralized routing

- ### Like the above self-organized routing
- ### Controller determines and distributes routing policy (routing table) to each member

Example: A sends M to B. Which path is better? A →E → B? or A → C → D → B?

- **Submit**
  - **PPTs + demo video**
  - **Source code (and the compiled executable files)**
  - **The project report documents (including introduction, design, setup and deploy, and result, project management records)**
  - **The individual report of each team members (your contributions, and anything else you want to talk about)**
  - **votes of the top 5 teams (based on their presentations and your observations, give comments of 2-3 sentences)**
  - **A list that shows each member's contribution and grade.**

- **Put all file into a package and name it as:**

  A_B_C.rar,

  A: the student ID of group leader;

  B: the name of group leader;

  C: task1 or task2

  example: 1500001_张三_task1.rar

- **Group leader submit it to the given FTP server.**

- **Basic points**
  - **Protocol design. (10 points)**
  - **Finish basic function correctly (w/o error). (60 points)**
  - **On time (WEEK 15). (10 points)**
  - **Documents, codes, presentation. (20 points)**
  - **votes**
  - **in-group assessment**