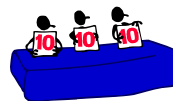




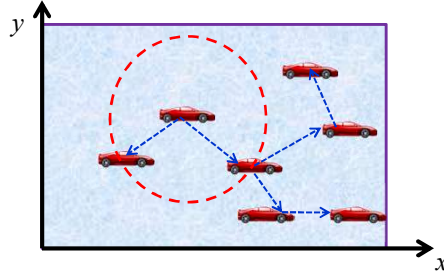
General Remarks

- The objective is to learn more in depth one particular topic
- The students have to show understanding of the topic of the project
- May involve some degree of research (mainly literature search)
- The projects are somewhat “open-ended”
- The students are free to determine the full scope of the projects
- The students are required to demonstrate originality of their design
- Projects are to be completed individually (single-student projects) or by the two teammates (two-student projects) ONLY
- Final Report: is due by the end of the semester (last day of the semester)
- Demos (?): Last 1-2 weeks of the course
- Grading based on:
 - Understanding of the topic
 - Originality of the design
 - Implementation details
 - Demo + final report



S1: Node Mobility (Routing in a mobile network)

- **Objective:** Design and implement a simulation of mobile nodes in an ad hoc network
- **Synopsis:** Define an area for mobile nodes to roam; define mobility pattern; update the location of a node in time; display the location of a node; determine connectivity of nodes; find routes
- **Challenge:** Implementation of scalable data-structures, determination of connectivity
- **Description:**



ID	x	y	v, ϕ	neigh
2	4.2	2.3	2.1, 127.3	5,11,54
5	7.1	7.9	3.2, 11.5	2,11,17
11	9.3	3.1	8.9, 180.0	2,5,54
17	5.0	1.5	7.2, 217.8	5,54
54	8.1	3.9	9.2, 157.6	2,11,17

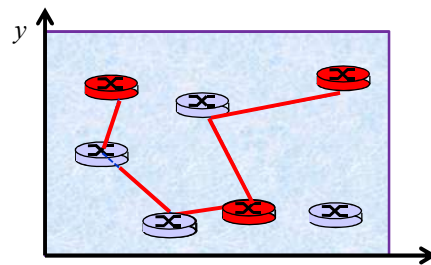
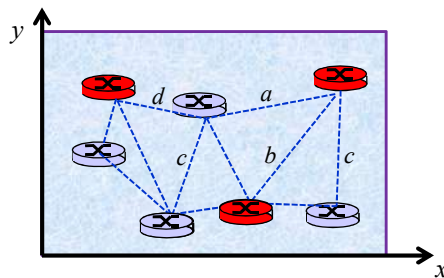
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S2: Steiner Tree

- **Objective:** Design and implement an algorithm to create a Steiner Tree for a network graph
- **Synopsis:** Define a network by a graph; identify the Steiner nodes; design a heuristic algorithm to compute the Steiner Tree
- **Challenge:** Scalable implementation of a heuristic algorithm
- **Description:**



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S3: Chat Program

- **Objective:** Design and program (socket programming) a simple chat session application
- **Synopsis:** Design a session between two individuals on separate computers to exchange messages. (An extended version of this project, which include graphical interface, may be a 2-person project)
- **Challenge:** Connection Management and Reliable Communication
- **Description:**

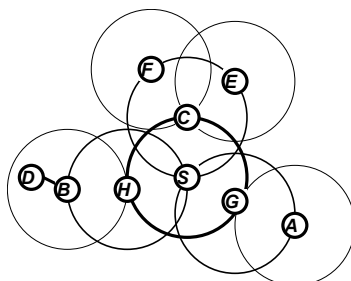


Possible extensions:

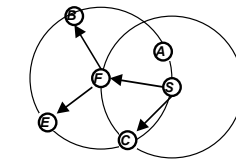
- Multi-party chat
- Multi-media
- Graphical interface

T1: Bordercasting

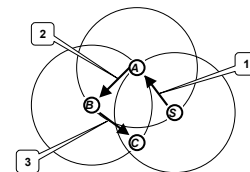
- **Objective:** Design and implement an algorithm to perform the bordercasting operation on a given network graph
- **Synopsis:** Define a network by a graph; Design an algorithm to route messages using the bordercast routing operation
- **Challenge:** Query propagation and termination algorithm
- **Description:**



An example of IERP operation



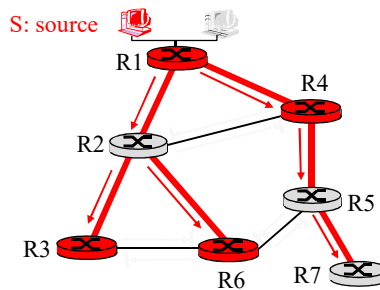
Preventing backwards IERP search



Preventing loopback IERP search

T2: Reliable Multicasting

- **Objective:** Design and program (socket programming) algorithm for reliable multicast communications
- **Synopsis:** Design an algorithm for reliable multicasting; (e.g., using TCP or multicast socket programming); implement the algorithm
- **Challenge:** Determination of the semantics of reliable multicasting
- **Description:**



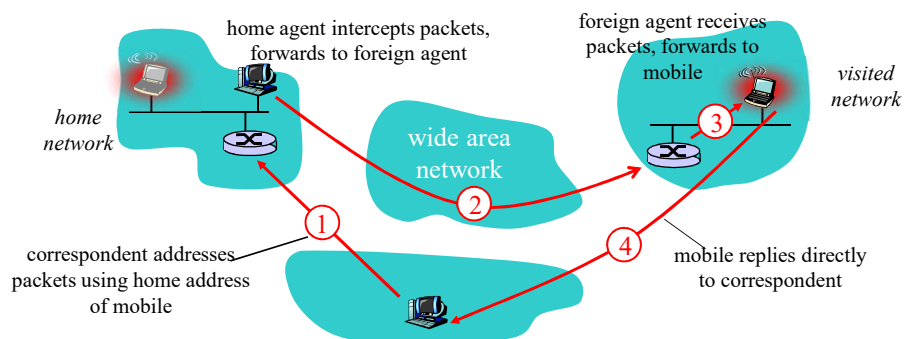
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T3: IP Mobility Support

- **Objective:** Design and program (socket programming) a simple Mobile IP protocol
- **Synopsis:** Implement the basic functions of the Mobile IP protocol to support routing for a mobile that is connected to any network
- **Challenge:** Implementation of the IP tunneling functionality
- **Description:**



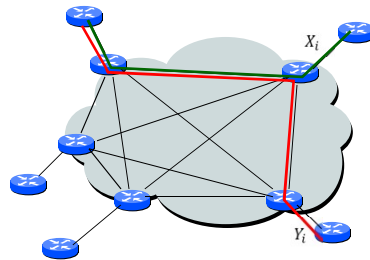
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T4: Path Statistics

- **Objective:** Design and implement an algorithm to collect delay measurements of Internet-based hosts and process for correlation
- **Synopsis:** Implement a collection process of end-to-end delay measurements of multiple connections and evaluate the correlation of the measurements
- **Challenge:** Processing of the measured values for correlation
- **Description:**



- Collect the X_i and Y_i measurements
- Average the measurement
- Calculate joint statistics

$$E(X) = \frac{1}{N} \sum_{i=1}^N X_i$$

$$E(Y) = \frac{1}{N} \sum_{i=1}^N Y_i$$

$$Cov(X, Y) = E((X - E(X))(Y - E(Y)))$$