Outline for April 7, 2005

1. Miscellaneous ACM points
   a. Copy flag
   b. Own as a special right
   c. Principle of Attenuation of Privilege

2. What is the safety question?
   a. An unauthorized state is one in which a generic right \( r \) could be leaked into an entry in the ACM that did not previously contain \( r \). An initial state is safe for \( r \) if it cannot lead to a state in which \( r \) could be leaked.
   b. Question: in a given arbitrary protection system, is safety decidable?
   c. Mono-operational protection systems: decidable
   d. Theorem: there is an algorithm that decides whether a given mono-operational system and initial state is safe for a given generic right.

3. General case: It is undecidable whether a given state of a given protection system is safe for a given generic right.
   a. Represent TM as ACM; reduce halting problem to it

4. Take-Grant
   a. Introduce as counterpoint to HRU result
   b. Show symmetry
   c. Show islands (maximal subject-only tg-connected subgraphs)
   d. Show bridges (as a combination of terminal and initial spans)

5. Predicates
   a. \( \text{can•share}(r, x, y, G_0) \) iff there is an edge from \( x \) to \( y \) labelled \( r \) in \( G_0 \), or all of the following hold:
      i. there is a vertex \( y' \) with an edge from \( y' \) to \( y \) labelled \( r \);
      ii. there is a subject \( y'' \) which terminally spans to \( y' \), or \( y'' = y' \);
      iii. there is a subject \( x' \) which initially spans to \( x \), or \( x' = x \); and
      iv. there is a sequence of islands \( I_1, \ldots, I_n \) connected by bridges for which \( x' \) is in \( I_1 \) and \( y' \) is in \( I_n \).
   b. Go through interpretation

6. Schematic Protection Model
   a. Model components
   b. Link function
   c. Filter function
   d. Example: Take-Grant as an instance of SPM
   e. Create operations and attenuation