Outline for April 8, 2004

1. 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.
2. 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
3. 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)
4. Predicates
   a. can•share(r, $\mathbf{x}$, $\mathbf{y}$, G_0) iff there is an edge from $\mathbf{x}$ to $\mathbf{y}$ labelled r in G_0, or all of the following hold:
      i. there is a vertex $\mathbf{y}'$ with an edge from $\mathbf{y}'$ to $\mathbf{y}$ labelled r;
      ii. there is a subject $\mathbf{y}''$ which terminally spans to $\mathbf{y}'$, or $\mathbf{y}'' = \mathbf{y}'$;
      iii. there is a subject $\mathbf{x}'$ which initially spans to $\mathbf{x}$, or $\mathbf{x}' = \mathbf{x}$; and
      iv. there is a sequence of islands $I_1, ..., I_n$ connected by bridges for which $\mathbf{x}'$ is in I_1 and $\mathbf{y}'$ is in I_n .
   b. Go through interpretation
5. 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
6. Expressive power
   a. HRU *vs*. SPM
   b. Multiparent joint creates in HRU
   c. Adding multiparent joint creates to SPM (giving ESPM)