Outline for January 15, 2008

1. Take-Grant
   a. Counterpoint to HRU result
   b. Symmetry of take and grant rights
   c. Islands (maximal subject-only \(tg\)-connected subgraphs)
   d. Bridges (as a combination of terminal and initial spans)

2. Sharing
   a. Definition: \(can\cdotshare(r, x, y, G_0)\) true iff there exists a sequence of protection graphs \(G_0, ..., G_n\) such that \(G_0 \vdash^* G_n\) using only take, grant, create, remove rules and in \(G_n\), there is an edge from \(x\) to \(y\) labeled \(r\)
   b. Theorem: \(can\cdotshare(r, x, y, G_0)\) iff there is an edge from \(x\) to \(y\) labeled \(r\) in \(G_0\), or all of the following hold:
      i. there is a vertex \(y'\) with an edge from \(y'\) to \(y\) labeled \(r\);
      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 \(I_1, ..., I_n\) connected by bridges for which \(x'\) is in \(I_1\) and \(y'\) is in \(I_n\).

3. Model Interpretation
   a. ACM very general, broadly applicable; Take-Grant more specific, can model fewer situations
   b. Theorem: \(G_0\) protection graph with exactly one subject, no edges; \(R\) set of rights. Then \(G_0 \vdash^* G\) iff \(G\) is a finite directed graph containing subjects and objects only, with edges labeled from nonempty subsets of \(R\), and with at least one subject with no incoming edges
   c. Example: shared buffer managed by trusted third part

4. Stealing
   a. Definition: \(can\cdotsteal(r, x, y, G_0)\) true iff there is no edge from \(x\) to \(y\) labeled \(r\) in \(G_0\), and there exists a sequence of protection graphs \(G_0, ..., G_n\) such that \(G_0 \vdash^* G_n\) in which:
      i. \(G_n\) has an edge from \(x\) to \(y\) labeled \(r\)
      ii. There is a sequence of rule applications \(\rho_1, ..., \rho_n\) such that \(G_{i-1} \vdash \rho_i\) and
      iii. For all vertices \(v, w\) in \(G_{i-1}\), if there is an edge from \(v\) to \(y\) in \(G_0\) labeled \(r\), then \(\rho_i\) is not of the form “\(v\) grants \(r\) to \(y\) to \(w\)”
   b. Example

5. Conspiracy
   a. Access set
   b. Deletion set
   c. Conspiracy graph
   d. \(I, T\) sets
   e. Theorem: \(can\cdotshare(r, x, y, G_0)\) iff there is a path from some \(h(p) \in I(x)\) to some \(h(q) \in T(y)\)