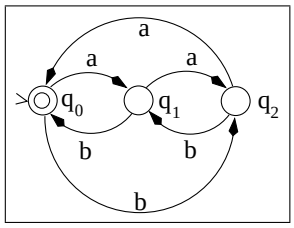
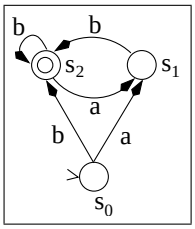
T–79.4301 **Spring 2008**
Parallel and Distributed Systems
Tutorial 4 - Mon Feb 18, 14:15

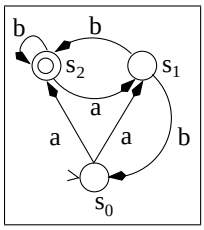
1. Consider the three following finite state automata, where $\Sigma_i = \{a, b\}$.
   Automaton $\mathcal{A}_1$:



   Automaton $\mathcal{A}_2$:



   Automaton $\mathcal{A}_3$:



   (a) Construct the finite state automaton $\mathcal{A}_a = \mathcal{A}_1 \cup \mathcal{A}_2$.
   (b) Construct the finite state automaton $\mathcal{A}_b = \mathcal{A}_1 \cap \mathcal{A}_2$.
   (c) Is the language accepted by $\mathcal{A}_b$ non-empty? If not, give a word accepted by $\mathcal{A}_b$.
   (d) Complement the deterministic automaton $\mathcal{A}_1$, and give the resulting automaton $\mathcal{A}_d$.
   (e) Give a deterministic finite state automaton $\mathcal{A}_e$, which accepts the same language as $\mathcal{A}_3$.
   (f) Describe the language accepted by $\mathcal{A}_1$ as a function of the number of occurrences of a and b.