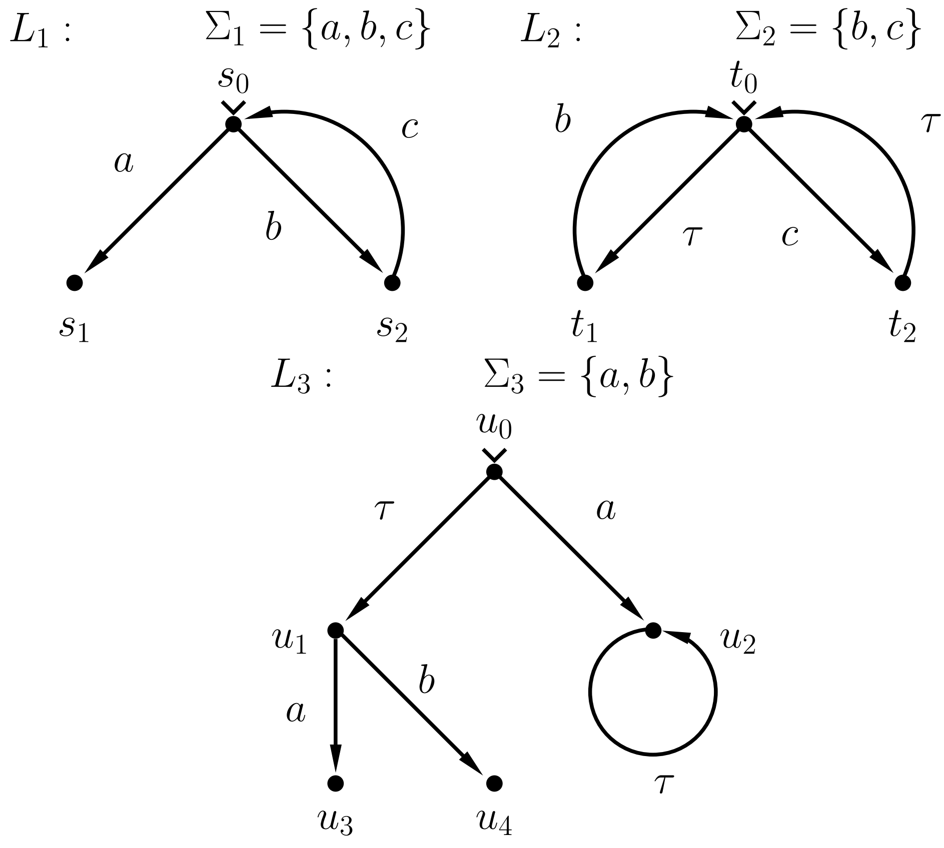
T–79.4301 **Spring 2006**

Parallel and Distributed Systems

Tutorial 6 - Wed Mar 15, 2006 11:15 and Fri Mar 17, 2006 14:15

1. Consider the following three LTSs L_1, L_2, and L_3:



a) Compute the parallel composition $L = L_1 \,||\, L_3$.

b) Does $L = L_1 \,||\, L_3$ contain any conflicts? If it does, please give a list consisting of triples (v, t, t'), where: v is a global states of L where a conflict occurs and t, t' are a pair of global transitions of $L_1 \,||\, L_3$ which are in conflict in v.

c) Does $L = L_1 \,||\, L_3$ contain any deadlock? If it does, please give a list of global states of L which are deadlocks.

d) Does $L = L_1 \,||\, L_3$ contain any livelocks? If it does, please give a lists global state of L in which a livelock exists.

e) Does $L = L_1 \,||\, L_3$ contain a pair of independent transitions? If it does, give two global transitions which are independent.

f) Give $\mathit{traces}(L_3)$ as a list of sequences over Σ_3.

g) Give $\mathit{traces}(L_1)$ as a regular expression.

h) Give a deterministic finite automaton accepting $\Sigma_1^* \setminus \mathit{traces}(L_2)$.

i) Check whether $\mathit{traces}(L_1) \subseteq \mathit{traces}(L_2)$ using the automaton constructed in the previous step. If not, give a word in $\mathit{traces}(L_1) \setminus \mathit{traces}(L_2)$