Software Specifications
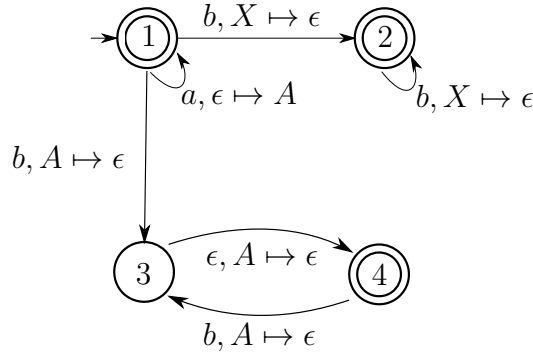# Push Down Automaton Example

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Example

Find a corresponding push down automata for the following language:

$$L_1 = \{a^i b^i \mid i \geq 0\} \cup \{a^{2i} b^i \mid i \geq 0\}.$$

Note that $\cup$ has the functional meaning of *or* where L_1 is made up of strings from either set.

For this language we need a non-deterministic push down automaton:

Given the input $a^4 b^2$, the computation table for this automaton is:

state	stack	remaining input
1	ϵ	aaaabb
1	A	aaaabb
1	AA	aabb
1	AAA	abb
1	AAAA	bb
3	AAA	b
4	AA	b
3	A	ϵ
4	ϵ	ϵ

An thus this string is accepted as it finished in a final state and the computation ended with an empty stack. Note that the operation $X \mapsto \epsilon$ is a pop operation as it is popping X and pushing the empty string (nothing). Also note that the first transition from 3 to 4 is effectively a ϵ-transition from state diagrams as the transition is nearly spontaneous as all that is needed to transition is nothing.