

CS252 HW2: Small-Step Operational Semantics for WHILE

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Evaluation Rules:	$e, \sigma \rightarrow e', \sigma'$
[SS-VAR]	$\frac{x \in \text{domain}(\sigma) \quad \sigma(x) = v}{x, \sigma \rightarrow \sigma(x), \sigma}$
[SS-ASSIGNCTXT]	$\frac{e, \sigma \rightarrow e', \sigma'}{x := e, \sigma \rightarrow x := e', \sigma'}$
[SS-ASSIGNRED]	$\frac{}{x := v, \sigma \rightarrow v, \sigma[x := v]}$
[SS-BINCTXT1]	$\frac{e_1, \sigma \rightarrow e'_1, \sigma'}{e_1 \text{ op } e_2, \sigma \rightarrow e'_1 \text{ op } e_2, \sigma'}$
[SS-BINCTXT2]	$\frac{e, \sigma \rightarrow e', \sigma'}{v \text{ op } e, \sigma \rightarrow v \text{ op } e', \sigma'}$
[SS-BINRED]	$\frac{v = v_1 \text{ op } v_2}{v_1 \text{ op } v_2, \sigma \rightarrow v, \sigma}$
[SS-UNCTXT]	$\frac{e, \sigma \rightarrow e', \sigma'}{\text{op1 } e, \sigma \rightarrow \text{op1 } e', \sigma'}$
[SS-UNRED]	$\frac{v = \text{applyUnop}(\text{op1 } v)}{\text{op1 } v, \sigma \rightarrow v', \sigma'}$
[SS-SEQCTXT]	$\frac{e_1, \sigma \rightarrow e'_1, \sigma'}{e_1; e_2, \sigma \rightarrow e'_1; e_2, \sigma'}$
[SS-SEQRED]	$\frac{}{v; e, \sigma \rightarrow e, \sigma}$

Figure 1: Small-step semantics for WHILE

[SS-IFCTXT]	$\frac{e, \sigma \rightarrow e', \sigma'}{\text{if } e_1 \text{ then } e_2 \text{ else } e_3, \sigma \rightarrow \text{if } e'_1 \text{ then } e_2 \text{ else } e_3, \sigma'}$
[SS-IFTRUE]	$\frac{}{\text{if true then } e_1 \text{ else } e_2, \sigma \rightarrow e_1, \sigma}$
[SS-IFFALSE]	$\frac{}{\text{if false then } e_1 \text{ else } e_2, \sigma \rightarrow e_2, \sigma}$
[SS-WHILE]	$\frac{}{\text{while } (e_1) \text{ } e_2, \sigma \rightarrow \text{if } e_1 \text{ then } e_2; \text{while } (e_1) \text{ } e_2 \text{ else false}, \sigma}$