Operational Semantics for the Android Activity Activation Mechanism

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1 Domains

b	$\in$	*Boolean*		boolean
s	$\in$	*String*		task name and task affinity attribute
a	$\in$	*ActivityInstance*		activity instance
A	$\in$	*ActivityClass*		activity class
t	$\in$	*Task*	$=$	*String* $\times$ *ActivityStack*
α	$\in$	*ActivityStack*		activity stack
β	$\in$	*BackStack*		back stack
γ	$\in$	*TaskSet*		task set in order
l	$\in$	*LaunchMode*	$=$	{ `standard`, `singleTop`, `singleTask`, `singleInstance` }
		IntentFlag	$=$	{ `FLAG_ACTIVITY_CLEAR_TASK`, `FLAG_ACTIVITY_CLEAR_TOP`, `FLAG_ACTIVITY_MULTIPLE_TASK`, `FLAG_ACTIVITY_NEW_TASK`, `FLAG_ACTIVITY_REORDER_TO_FRONT`, `FLAG_ACTIVITY_SINGLE_TOP`, `FLAG_ACTIVITY_TASK_ON_HOME` }
F	$\subseteq$	*IntentFlag*		

$$
\begin{array}{lll}
\alpha & ::= & \epsilon \\
& | & (a, l)::\alpha
\end{array}
$$

$$
\begin{array}{lll}
\beta & ::= & \epsilon \\
& | & t::\beta
\end{array}
$$

$$
\begin{array}{lll}
\gamma & ::= & \epsilon \\
& | & t::\gamma
\end{array}
$$

$$
\begin{array}{lll}
C & ::= & \texttt{BackButton} \\
& | & \texttt{HomeButton} \\
& | & (a, l).\texttt{startActivity}(A, l, s, F)
\end{array}
$$

2 Helper Functions

$\boxed{instanceOf : ActivityInstance \times ActivityClass \to Boolean}$
returns whether a given activity instance is an instance of a given activity class

$\boxed{new : ActivityClass \to ActivityInstance}$
returns an instance of a given activity class

$\boxed{newTask : String \times (ActivityInstance \times LaunchMode) \to Task}$
creates a new task with a given task name, activity instance, and its launch mode

$$newTask(s, (a, l)) \to (s, (a, l) :: \epsilon)$$

$\boxed{removeTaskTS : TaskSet \times Task \to TaskSet}$
removes a given task from a given task set

$$removeTaskTS(\epsilon, t) \to \epsilon$$

$$\frac{t' \neq t}{removeTaskTS(t' :: \gamma, t) \to t' :: removeTaskTS(\gamma, t)}$$

$$removeTaskTS(t :: \gamma, t) \to \gamma$$

$\boxed{removeTaskBS : BackStack \times Task \to BackStack}$
removes a given task from a given back stack

$$removeTaskBS(\epsilon, t) \to \epsilon$$

$$\frac{t' \neq t}{removeTaskBS(t' :: \beta, t) \to t' :: removeTaskBS(\beta, t)}$$

$$removeTaskBS(t :: \beta, t) \to \beta$$

$\boxed{removeActivity : ActivityStack \times (ActivityInstance \times LaunchMode) \to ActivityStack}$
removes a given activity from a given activity stack

$$removeActivity(\epsilon, (a, l)) \to \epsilon$$

$$\frac{a' \neq a}{removeActivity((a', l') :: \alpha, (a, l)) \to (a', l') :: removeActivity(\alpha, (a, l))}$$

$$removeActivity((a, l) :: \alpha, (a, l)) \to \alpha$$

$\boxed{removeActsUntil : ActivityStack \times (ActivityInstance \times LaunchMode) \to ActivityStack}$
removes activity instances on top of and including a given activity instance from a given activity stack

$$\frac{a \neq a'}{removeActsUntil((a,l)::\alpha,(a',l')) \to removeActsUntil(\alpha,(a',l'))}$$

$$removeActsUntil((a,l)::\alpha,(a,l')) \to \alpha$$

$\boxed{getTask : TaskSet \times String \to Task \cup \{\star\}}$
returns $\star$ or a task with a given name from a given task set

$$getTask(\epsilon, s) \to \star$$

$$\frac{s \neq s'}{getTask((s, \alpha)::\gamma, s') \to getTask(\gamma, s')}$$

$$\frac{\alpha = (a, l)::\alpha' \qquad l \neq \texttt{singleInstance}}{getTask((s, \alpha)::\gamma, s) \to (s, \alpha)}$$

$$\frac{\alpha = (a, l)::\alpha' \qquad l = \texttt{singleInstance}}{getTask((s, \alpha)::\gamma, s) \to getTask(\gamma, s)}$$

$\boxed{getActivity\colon\ ActivityStack \times ActivityClass \to ActivityInstance \cup \{\star\}}$
returns $\star$ or an instance of a given activity class from a given activity stack

$$getActivity(\epsilon, A) \to \star$$

$$\frac{\neg\, instanceOf(a, A)}{getActivity((a, l)::\alpha, A) \to getActivity(\alpha, A)}$$

$$\frac{instanceOf(a, A)}{getActivity((a, l)::\alpha, A) \to a}$$

$\boxed{getTaskWAct\colon\ TaskSet \times ActivityClass \to Task \cup \{\star\}}$
returns $\star$ or a task that contains an instance of a given activity class from a given task set

$$getTaskWAct(\epsilon, A) \to \star$$

$$\frac{\star = getActivity(\alpha, A)}{getTaskWAct((s, \alpha)::\gamma, A) \to getTaskWAct(\gamma, A)}$$

$$\frac{a' = getActivity(\alpha, A)}{getTaskWAct((s, \alpha)::\gamma, A) \to (s, \alpha)}$$

3 Semantics

$\boxed{\langle \gamma, \beta \rangle \vdash C \rightarrow \langle \gamma, \beta \rangle}$

3.1 BackButton

$$\langle \gamma, \epsilon \rangle \vdash \texttt{BackButton} \rightarrow \langle \gamma, \epsilon \rangle$$

$$\frac{\alpha = (a, l) :: \epsilon \qquad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha))}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash \texttt{BackButton} \rightarrow \langle \gamma', \beta \rangle}$$

$$\frac{\alpha = (a, l) :: \alpha' \qquad \alpha' \neq \epsilon \qquad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha))}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash \texttt{BackButton} \rightarrow \langle (s, \alpha') :: \gamma', (s, \alpha') :: \beta \rangle}$$

3.2 HomeButton

$$\langle \gamma, \beta \rangle \vdash \texttt{HomeButton} \rightarrow \langle \gamma, \epsilon \rangle$$

3.3 StartActivity

3.3.1 Target Activity's LaunchMode Is `singleInstance`

For a task $(s, (a, \texttt{singleInstance}) :: \alpha')$, α' is always ϵ and no activity can be put on top of the activity stack. Thus, $(a, \texttt{singleInstance})$ is the root and the top activity of the activity stack.

$$\frac{\star = \mathit{getTaskWAct}(\gamma, A) \qquad a' = \mathit{new}(A) \qquad t = \mathit{newTask}(s, (a', \texttt{singleInstance}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, \emptyset) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{t = \mathit{getTaskWAct}(\gamma, A) \qquad \gamma' = \mathit{removeTaskTS}(\gamma, t) \qquad \beta' = \mathit{removeTaskBS}(\beta, t)}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, \emptyset) \rightarrow \langle t :: \gamma', t :: \beta' \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \\ \star = \mathit{getTaskWAct}(\gamma, A) \qquad a' = \mathit{new}(A) \qquad t = \mathit{newTask}(s, (a', \texttt{singleInstance})) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \\ t = \mathit{getTaskWAct}(\gamma, A) \qquad \gamma' = \mathit{removeTaskTS}(\gamma, t) \qquad \beta' = \mathit{removeTaskBS}(\beta, t) \\ a' = \mathit{new}(A) \qquad t' = \mathit{newTask}(s, (a', \texttt{singleInstance})) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, F) \rightarrow \langle t' :: \gamma', t' :: \beta' \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, \emptyset) \rightarrow \langle \gamma', t :: \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, F) \rightarrow \langle \gamma', t :: \epsilon \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, F') \rightarrow \langle \gamma', t :: \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleInstance}, s, F) \rightarrow \langle \gamma', t :: \epsilon \rangle}$$

3.3.2 Target Activity's LaunchMode Is `singleTask`

$$\frac{\star = \mathit{getTaskWAct}(\gamma, A) \qquad a' = \mathit{new}(A) \qquad \star = \mathit{getTask}(\gamma, s) \qquad t = \mathit{newTask}(s, (a', \texttt{singleTask}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, \emptyset) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{\star = \mathit{getTaskWAct}(\gamma, A) \qquad a' = \mathit{new}(A) \qquad (s, \alpha) = \mathit{getTask}(\gamma, s) \qquad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \qquad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha)) \qquad t = (s, (a', \texttt{singleTask}) :: \alpha)}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, \emptyset) \rightarrow \langle t :: \gamma', t :: \beta' \rangle}$$

$$\frac{(s, \alpha) = \mathit{getTaskWAct}(\gamma, A) \qquad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \qquad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha)) \qquad a' = \mathit{getActivity}(\alpha, A) \qquad \alpha' = \mathit{removeActsUntil}(\alpha, (a', \texttt{singleTask})) \qquad t = (s, (a', \texttt{singleTask}) :: \alpha')}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, \emptyset) \rightarrow \langle t :: \gamma', t :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \qquad \star = \mathit{getTaskWAct}(\gamma, A) \qquad a' = \mathit{new}(A) \qquad \star = \mathit{getTask}(\gamma, s) \qquad t = \mathit{newTask}(s, (a', \texttt{singleTask}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \qquad \star = \mathit{getTaskWAct}(\gamma, A) \qquad a' = \mathit{new}(A) \qquad t = \mathit{getTask}(\gamma, s) \qquad \gamma' = \mathit{removeTaskTS}(\gamma, t) \qquad \beta' = \mathit{removeTaskBS}(\beta, t) \qquad t' = \mathit{newTask}(s, (a', \texttt{singleTask}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, F) \rightarrow \langle t' :: \gamma', t' :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \qquad t = \mathit{getTaskWAct}(\gamma, A) \qquad \gamma' = \mathit{removeTaskTS}(\gamma, t) \qquad \beta' = \mathit{removeTaskBS}(\beta, t) \qquad a' = \mathit{new}(A) \qquad t' = \mathit{newTask}(s, (a', \texttt{singleTask}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, F) \rightarrow \langle t' :: \gamma', t' :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \qquad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, \emptyset) \rightarrow \langle \gamma', t :: \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, F) \rightarrow \langle \gamma', t :: \epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \qquad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \qquad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, F') \rightarrow \langle \gamma', t :: \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTask}, s, F) \rightarrow \langle \gamma', t :: \epsilon \rangle}$$

3.3.3 Target Activity's LaunchMode Is `singleTop`

$$\frac{l \neq \texttt{singleInstance} \qquad \alpha = (a', l') :: \alpha' \qquad \neg\, instanceOf(a', A) \qquad a'' = new(A) \qquad \alpha'' = (a'', \texttt{singleTop}) :: \alpha}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, \emptyset) \rightarrow \langle \gamma, (s, \alpha'') :: \beta \rangle}$$

$$\frac{l \neq \texttt{singleInstance} \qquad \alpha = (a', l') :: \alpha' \qquad instanceOf(a', A)}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, \emptyset) \rightarrow \langle \gamma, (s, \alpha) :: \beta \rangle}$$

$$\frac{\star = getTask(\gamma, s) \qquad a' = new(A) \qquad t = newTask(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, \emptyset) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{(s, \alpha) = getTask(\gamma, s) \qquad \alpha = (a', l) :: \alpha' \qquad \neg\, instanceOf(a', A) \qquad a'' = new(A) \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskBS(\beta, (s, \alpha)) \qquad t' = (s, (a'', \texttt{singleTop}) :: \alpha)}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, \emptyset) \rightarrow \langle t' :: \gamma', t' :: \beta' \rangle}$$

$$\frac{(s, \alpha) = getTask(\gamma, s) \qquad \alpha = (a', l) :: \alpha' \qquad instanceOf(a', A) \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskBS(\beta, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, \emptyset) \rightarrow \langle (s, \alpha) :: \gamma', (s, \alpha) :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \qquad l \neq \texttt{singleInstance} \qquad \alpha = (a', l') :: \alpha' \qquad \neg\, instanceOf(a', A) \qquad \star = getActivity(\alpha, A) \qquad \gamma' = removeTaskTS(\gamma, (s, a)) \qquad a'' = new(A) \qquad \alpha'' = (a'', \texttt{singleTop}) :: \alpha}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \qquad l \neq \texttt{singleInstance} \qquad \alpha = (a', l') :: \alpha' \qquad \neg\, instanceOf(a', A) \qquad (a'', l'') = getActivity(\alpha, A) \qquad \alpha'' = removeActivity(\alpha, (a'', l'')) \qquad \alpha''' = (a'', l'') :: \alpha'' \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha))}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha''') :: \gamma', (s, \alpha''') :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \qquad l \neq \texttt{singleInstance} \qquad \alpha = (a', l') :: \alpha' \qquad instanceOf(a', A)}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma, (s, \alpha) :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \qquad \star = getTask(\gamma, s) \qquad a' = new(A) \qquad t' = newTask(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t' :: \gamma, t' :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \qquad (s, \alpha) = getTask(\gamma, s) \qquad \alpha = (a', l) :: \alpha' \qquad \neg\, instanceOf(a', A) \qquad \star = getActivity(\alpha, A) \qquad a'' = new(A) \qquad \alpha'' = (a'', \texttt{singleTop}) :: \alpha \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskBS(\beta, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \qquad (s, \alpha) = getTask(\gamma, s) \qquad \alpha = (a', l) :: \alpha' \qquad \neg\, instanceOf(a', A) \qquad (a'', l') = getActivity(\alpha, A) \qquad \alpha'' = removeActivity(\alpha, (a'', l')) \qquad \alpha''' = (a'', l') :: \alpha'' \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskBS(\beta, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha''') :: \gamma', (s, \alpha''') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{singleTop})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha))}{\langle \gamma, (s,\alpha)::\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l'') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActsUntil}(\alpha, (a'', l'')) \quad \alpha''' = (a'', l'')::\alpha'' \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha))}{\langle \gamma, (s,\alpha)::\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha''')::\gamma', (s,\alpha''')::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l')::\alpha' \quad \mathit{instanceOf}(a', A)}{\langle \gamma, (s,\alpha)::\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma, (s,\alpha)::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t' = \mathit{newTask}(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t'::\gamma, t'::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{singleTop})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActsUntil}(\alpha, (a'', l')) \quad \alpha''' = (a'', l')::\alpha'' \quad \gamma' = \mathit{removeTaskBS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha''')::\gamma', (s,\alpha''')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t' = \mathit{newTask}(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t'::\gamma, t'::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{singleTop})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad instanceOf(a', A) \quad \gamma' = removeTaskTS(\gamma, (s,\alpha)) \quad \beta' = removeTaskBS(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \star = getTask(\gamma, s) \quad a' = new(A) \quad t' = newTask(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t'::\gamma, t'::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad t = getTask(\gamma, s) \quad a' = new(A) \quad t' = newTask(s, (a', \texttt{singleTop})) \quad \gamma' = removeTaskTS(\gamma, t) \quad \beta' = removeTaskBS(\beta, t)}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t'::\gamma', t'::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, \emptyset) \rightarrow \langle \gamma', t::\beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \star = getTask(\gamma, s) \quad a' = new(A) \quad t = newTask(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \neg\, instanceOf(a', A) \quad a'' = new(A) \quad t = newTask(s, (a'', \texttt{singleTop}))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad instanceOf(a', A) \quad \gamma' = removeTaskTS(\gamma, (s,\alpha)) \quad \beta' = removeTaskBS(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \to \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \to \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \to \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \to \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \to \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \to \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{singleTop}))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{singleTop})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, t)}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle(s,\alpha'')::\gamma, (s,\alpha'')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l'') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActivity}(\alpha, (a'', l'')) \quad \alpha''' = (a'', l'')::\alpha'' \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle(s,\alpha''')::\gamma', (s,\alpha''')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \to \langle(s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l') :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \\ a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{singleTop}) :: \alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha)) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta' \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l') :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l'') = \mathit{getActivity}(\alpha, A) \\ \alpha'' = \mathit{removeActsUntil}(\alpha, (a'', l'')) \quad \alpha''' = (a'', l'') :: \alpha'' \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha)) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha''') :: \gamma', (s, \alpha''') :: \beta' \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l') :: \alpha' \quad \mathit{instanceOf}(a', A) \\ \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha)) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha) :: \gamma', (s, \alpha) :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ t = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t' = \mathit{newTask}(s, (a', \texttt{singleTop})) \quad \gamma' = \mathit{removeTaskTS}(\gamma, t) \\ \beta' = \mathit{removeTaskBS}(\beta, t) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t' :: \gamma', t' :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{singleTop}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l') :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \\ a'' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a'', \texttt{singleTop})) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l') :: \alpha' \quad \mathit{instanceOf}(a', A) \\ \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha)) \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle (s, \alpha) :: \gamma', (s, \alpha) :: \beta' \rangle}$$

$$\frac{\begin{array}{c} F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t :: \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t :: \epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', \beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', \beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle\end{array}}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle\end{array}}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP},$$
$$\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F') \rightarrow \langle \gamma', t :: \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{singleTop}, s, F) \rightarrow \langle \gamma', t :: \epsilon \rangle}$$

3.3.4 Target Activity's LaunchMode Is `standard`

$$\frac{l \neq \texttt{singleInstance} \qquad a' = new(A) \qquad \alpha' = (a', \texttt{standard})::\alpha \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha))}{\langle \gamma, (s, \alpha)::\beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, \emptyset) \rightarrow \langle (s, \alpha')::\gamma', (s, \alpha')::\beta \rangle}$$

$$\frac{\star = getTask(\gamma, s) \qquad a' = new(A) \qquad t = newTask(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, \emptyset) \rightarrow \langle t::\gamma, t::\beta \rangle}$$

$$\frac{\begin{array}{c}(s, \alpha) = getTask(\gamma, s) \qquad a' = new(A) \qquad \alpha' = (a', \texttt{standard})::\alpha \\ \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskBS(\beta, (s, \alpha))\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, \emptyset) \rightarrow \langle (s, \alpha')::\gamma', (s, \alpha')::\beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \\ l \neq \texttt{singleInstance} \qquad \star = getActivity(\alpha, A) \qquad a' = new(A) \qquad \alpha' = (a', \texttt{standard})::\alpha \\ \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskTS(\gamma, (s, \alpha))\end{array}}{\langle \gamma, (s, \alpha)::\beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha')::\gamma', (s, \alpha')::\beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \\ l \neq \texttt{singleInstance} \qquad (a', l') = getActivity(\alpha, A) \qquad \alpha' = removeActsUntil(\alpha, (a', l')) \\ a'' = new(A) \qquad \alpha'' = (a'', \texttt{standard})::\alpha' \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskTS(\gamma, (s, \alpha))\end{array}}{\langle \gamma, (s, \alpha)::\beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'')::\gamma', (s, \alpha'')::\beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \\ \star = getTask(\gamma, s) \qquad a' = new(A) \qquad t = newTask(s, (a', \texttt{standard}))\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \\ (s, \alpha) = getTask(\gamma, s) \qquad \star = getActivity(\alpha, A) \qquad a' = new(A) \qquad \alpha' = (a', \texttt{standard})::\alpha \\ \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskTS(\gamma, (s, \alpha))\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha')::\gamma', (s, \alpha')::\beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \\ (s, \alpha) = getTask(\gamma, s) \qquad (a', l) = getActivity(\alpha, A) \qquad \alpha' = removeActsUntil(\alpha, (a', l)) \\ a'' = new(A) \qquad \alpha'' = (a'', \texttt{standard})::\alpha' \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskTS(\gamma, (s, \alpha))\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'')::\gamma', (s, \alpha'')::\beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \\ l \neq \texttt{singleInstance} \qquad \star = getActivity(\alpha, A) \qquad a' = new(A) \qquad \alpha' = (a', \texttt{standard})::\alpha \\ \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskTS(\gamma, (s, \alpha))\end{array}}{\langle \gamma, (s, \alpha)::\beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha')::\gamma', (s, \alpha')::\beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \\ l \neq \texttt{singleInstance} \qquad (a', l') = getActivity(\alpha, A) \qquad \alpha' = removeActivity(\alpha, (a', l')) \\ \alpha'' = (a', l')::\alpha' \qquad \gamma' = removeTaskTS(\gamma, (s, \alpha)) \qquad \beta' = removeTaskTS(\gamma, (s, \alpha))\end{array}}{\langle \gamma, (s, \alpha)::\beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'')::\gamma', (s, \alpha'')::\beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \star = \mathit{getActivity}(\alpha, A) \quad a' = \mathit{new}(A) \quad \alpha' = (a', \texttt{standard}) :: \alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskTS}(\gamma, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha') :: \gamma', (s, \alpha') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad (s, \alpha) = \mathit{getTask}(\gamma, s) \quad (a', l) = \mathit{getActivity}(\alpha, A) \quad \alpha' = \mathit{removeActivity}(\alpha, (a', l)) \quad \alpha'' = (a', l) :: \alpha' \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskTS}(\gamma, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l') :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{standard}) :: \alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha))}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l') :: \alpha' \quad \mathit{instanceOf}(a', A)}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma, (s, \alpha) :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l) :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{standard}) :: \alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l) :: \alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha) :: \gamma', (s, \alpha) :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s, \alpha) = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad \alpha' = (a', \texttt{standard}) :: \alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha') :: \gamma', (s, \alpha') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad t = \mathit{getTask}(\gamma, s) \quad \gamma' = \mathit{removeTaskTS}(\gamma, t) \quad \beta' = \mathit{removeTaskBS}(\beta, t) \quad a' = \mathit{new}(A) \quad t' = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t' :: \gamma', t' :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}\} \quad \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, \emptyset) \rightarrow \langle \gamma', t :: \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t :: \epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l') :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{singleTop}) :: \alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha))}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l') :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l'') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActivity}(\alpha, (a'', l'')) \quad \alpha''' = (a'', l'') :: \alpha'' \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha))}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha''') :: \gamma', (s, \alpha''') :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l') :: \alpha' \quad \mathit{instanceOf}(a', A)}{\langle \gamma, (s, \alpha) :: \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma, (s, \alpha) :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t :: \gamma, t :: \beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l) :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{standard}) :: \alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha))}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha'') :: \gamma', (s, \alpha'') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s, \alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l) :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActivity}(\alpha, (a'', l')) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s, \alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s, \alpha)) \quad \alpha''' = ((a'', l') :: \alpha'')}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s, \alpha''') :: \gamma', (s, \alpha''') :: \beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{singleTop})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha))}{\langle \gamma, (s,\alpha)::\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l'') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActsUntil}(\alpha, (a'', l'')) \quad \alpha''' = (a'', l'')::\alpha'' \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha))}{\langle \gamma, (s,\alpha)::\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha''')::\gamma', (s,\alpha''')::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad l \neq \texttt{singleInstance} \quad \alpha = (a', l')::\alpha' \quad \mathit{instanceOf}(a', A)}{\langle \gamma, (s,\alpha)::\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma, (s,\alpha)::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{standard})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActsUntil}(\alpha, (a'', l')) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha)) \quad \alpha''' = ((a'', l')::\alpha'')}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha''')::\gamma', (s,\alpha''')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle \gamma, \beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \star = \mathit{getActivity}(\alpha, A) \quad a' = \mathit{new}(A) \quad \alpha' = (a', \texttt{standard})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskTS}(\gamma, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha')::\gamma', (s,\alpha')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad (a',l') = getActivity(\alpha, A) \quad \alpha' = removeActsUntil(\alpha, (a',l')) \quad a'' = new(A) \quad \alpha'' = (a'', \texttt{standard})::\alpha' \quad \gamma' = removeTaskTS(\gamma, (s,\alpha)) \quad \beta' = removeTaskTS(\gamma, (s,\alpha))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = getTask(\gamma, s) \quad a' = new(A) \quad t = newTask(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad \star = getActivity(\alpha, A) \quad a' = new(A) \quad \alpha' = (a', \texttt{standard})::\alpha \quad \gamma' = removeTaskTS(\gamma, (s,\alpha)) \quad \beta' = removeTaskTS(\gamma, (s,\alpha))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha')::\gamma', (s,\alpha')::\beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad (a',l') = getActivity(\alpha, A) \quad \alpha' = removeActivity(\alpha, (a',l')) \quad \alpha'' = (a',l')::\alpha' \quad \gamma' = removeTaskTS(\gamma, (s,\alpha)) \quad \beta' = removeTaskTS(\gamma, (s,\alpha))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = getTask(\gamma, s) \quad a' = new(A) \quad t = newTask(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad \alpha = (a',l')::\alpha' \quad \neg\, instanceOf(a', A) \quad a'' = new(A) \quad \alpha'' = (a'', \texttt{standard})::\alpha \quad \gamma' = removeTaskTS(\gamma, (s,\alpha)) \quad \beta' = removeTaskBS(\beta, (s,\alpha))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha'')::\gamma', (s,\alpha'')::\beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = getTask(\gamma, s) \quad \alpha = (a',l')::\alpha' \quad instanceOf(a', A) \quad \gamma' = removeTaskTS(\gamma, (s,\alpha)) \quad \beta' = removeTaskBS(\beta, (s,\alpha))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha)::\gamma', (s,\alpha)::\beta' \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad a' = new(A) \quad t = newTask(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = getTask(\gamma, s) \quad a' = new(A) \quad t = newTask(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad t = getTask(\gamma, s) \quad \gamma' = removeTaskTS(\gamma, t) \quad \beta' = removeTaskBS(\beta, t) \quad a' = new(A) \quad t' = newTask(s, (a', \texttt{standard}))}{\langle \gamma, \beta \rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t'::\gamma', t'::\beta' \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\}$$
$$F' = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\}$$
$$\frac{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', \beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', \beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad a'' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a'', \texttt{standard}))}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l)::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle(s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{standard})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle(s,\alpha'')::\gamma', (s,\alpha'')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l'') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActivity}(\alpha, (a'', l'')) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha)) \quad \alpha''' = ((a'', l'')::\alpha'')}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle(s,\alpha''')::\gamma', (s,\alpha''')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle(s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F') \to \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F') \to \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F') \to \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F') \to \langle\gamma', \beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle\gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F') \to \langle\gamma', \beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle\gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad a'' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a'', \texttt{standard}))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle(s,\alpha)::\gamma', (s,\alpha)::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad \star = \mathit{getTask}(\gamma, s) \quad a' = \mathit{new}(A) \quad t = \mathit{newTask}(s, (a', \texttt{standard}))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle t::\gamma, t::\beta\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l')::\alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad \star = \mathit{getActivity}(\alpha, A) \quad a'' = \mathit{new}(A) \quad \alpha'' = (a'', \texttt{standard})::\alpha \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle\gamma,\beta\rangle \vdash (a,l).\texttt{startActivity}(A, \texttt{standard}, s, F) \to \langle(s,\alpha'')::\gamma', (s,\alpha'')::\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\,\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l') :: \alpha' \quad \neg\, \mathit{instanceOf}(a', A) \quad (a'', l'') = \mathit{getActivity}(\alpha, A) \quad \alpha'' = \mathit{removeActsUntil}(\alpha, (a'', l'')) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha)) \quad \alpha''' = ((a'', l'') :: \alpha'')}{\langle \gamma, \beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha'') :: \gamma', (s,\alpha'') :: \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\,\texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \quad (s,\alpha) = \mathit{getTask}(\gamma, s) \quad \alpha = (a', l') :: \alpha' \quad \mathit{instanceOf}(a', A) \quad \gamma' = \mathit{removeTaskTS}(\gamma, (s,\alpha)) \quad \beta' = \mathit{removeTaskBS}(\beta, (s,\alpha))}{\langle \gamma, \beta\rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle (s,\alpha) :: \gamma', (s,\alpha) :: \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t :: \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t :: \epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t :: \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t :: \epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t :: \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t :: \epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t :: \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t :: \epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta'\rangle}{\langle \gamma, \beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma', t::\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma', t::\epsilon\rangle}$$

$$\frac{F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \quad \langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle\gamma',\beta'\rangle}{\langle\gamma,\beta\rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle\gamma',\beta'\rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \\ \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle\end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', \beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', \beta' \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}\} \\ \langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, \texttt{singleInstance}).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_CLEAR\_TOP}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$

$$\frac{\begin{array}{c}F = \{\texttt{FLAG\_ACTIVITY\_CLEAR\_TASK}, \texttt{FLAG\_ACTIVITY\_REORDER\_TO\_FRONT}, \texttt{FLAG\_ACTIVITY\_TASK\_ON\_HOME}, \\ \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ F' = \{\texttt{FLAG\_ACTIVITY\_MULTIPLE\_TASK}, \texttt{FLAG\_ACTIVITY\_SINGLE\_TOP}, \texttt{FLAG\_ACTIVITY\_NEW\_TASK}\} \\ \langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F') \rightarrow \langle \gamma', t::\beta' \rangle \end{array}}{\langle \gamma, \beta \rangle \vdash (a, l).\texttt{startActivity}(A, \texttt{standard}, s, F) \rightarrow \langle \gamma', t::\epsilon \rangle}$$