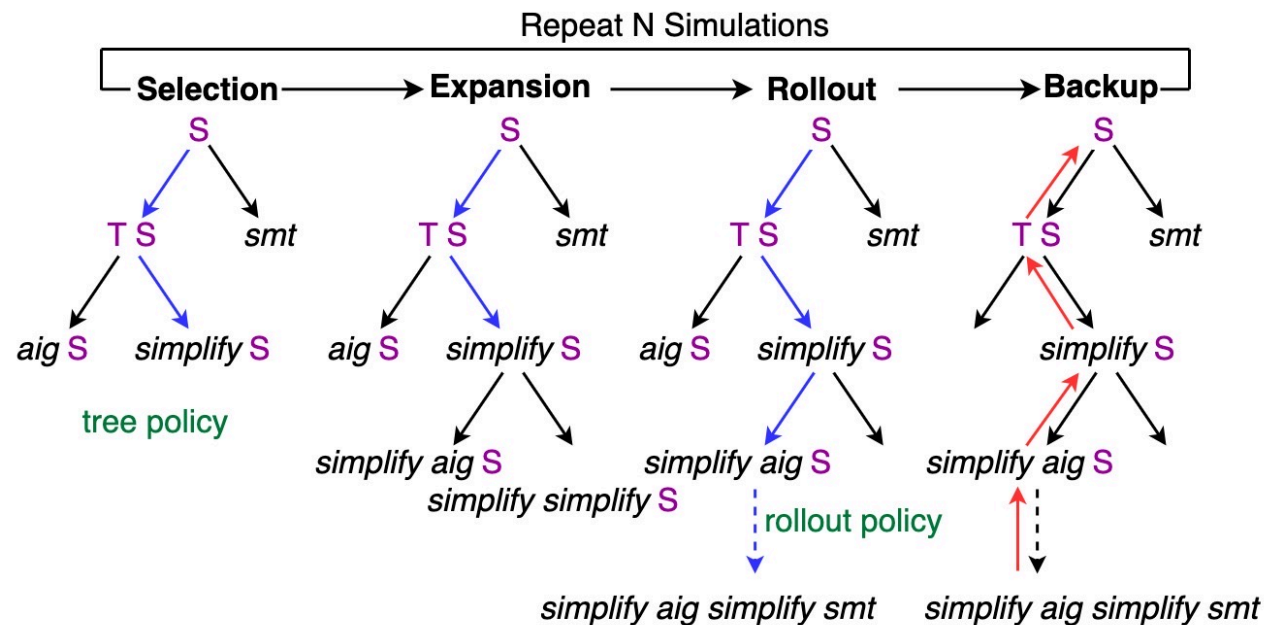


# Z3-alpha: an SMT Strategy Synthesis Solver with Layer and Staged Monte Carlo Tree Search

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Illustration of **MCTS for SMT Strategy Synthesis**  
with a simplified CFG:  $S \rightarrow TS \mid smt$ ;  $T \rightarrow simplify \mid aig$



To address the challenges of **extensive time for each evaluation**, we have introduced two heuristics:

- **Layer Search** for tactic parameter configuration
- **Staged Search** for branching strategies

## Synthesized Strategy for QF\_S

```
(or-else (try-for (then propagate-values ext_str (using-params smt :random_seed 0)) 1140000) (or-else  
(try-for (then solve-eqs (using-params smt :random_seed 200)) 30000) (then elim-uncnstr solve-eqs  
(using-params simplify :elim_and true :blast_distinct true :local_ctx true) ext_strSimplify arr)))
```