

Assignment 2

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Assignment 2: Control-Dependence

Context-Sensitive ICFG Traversal

- You will be using what you have learned about ICFG and context-sensitive graph traversal.
- **Goal:** implement a context-sensitive graph traversal on ICFG and print **feasible** paths from a source node to a sink node on the graph

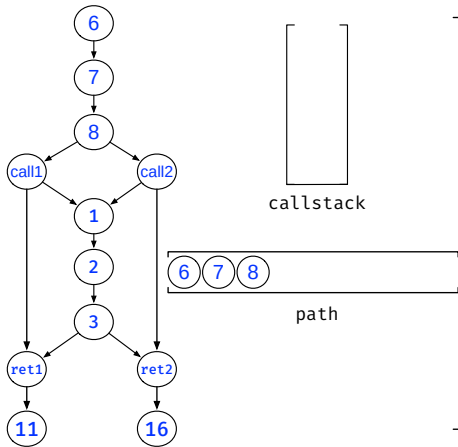
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- **Goal:** implement a context-sensitive graph traversal on ICFG and print **feasible** paths from a source node to a sink node on the graph
- **Specification and code template:**
<https://github.com/SVF-tools/SVF-Teaching/wiki/Assignment-2>
- **SVF CPP API**
<https://github.com/SVF-tools/SVF-Teaching/wiki/SVF-CPP-API>

Context-Sensitive Control-Dependence

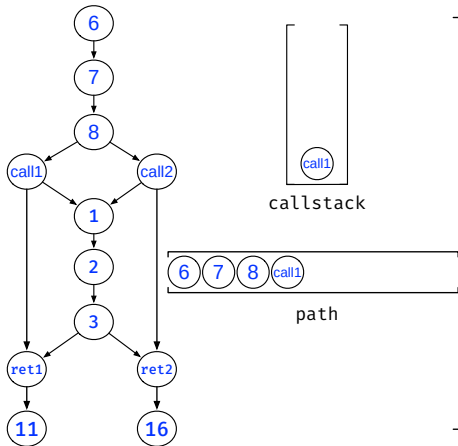
Obtaining a path from node 6 to node 11 on ICFG



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path: vector<NodeID>
callstack: stack<callsite> //A stack of LLVM call instructions
DFS(visited, path, callstack, src, dst)
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2 path.push_back(src)
3 if src == dst then
4   Print path
5 foreach edge e ∈ outEdges(src) do
6   if e.dst ∉ visited then
7     if e.isIntraCFGEde() then
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9   else if e.isCallCFGEde() then
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16 visited.erase(src);
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Context-Sensitive Control-Dependence

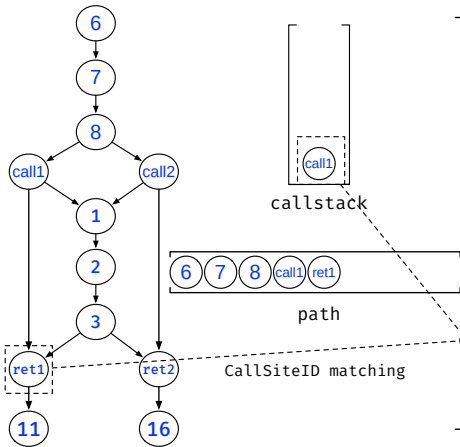
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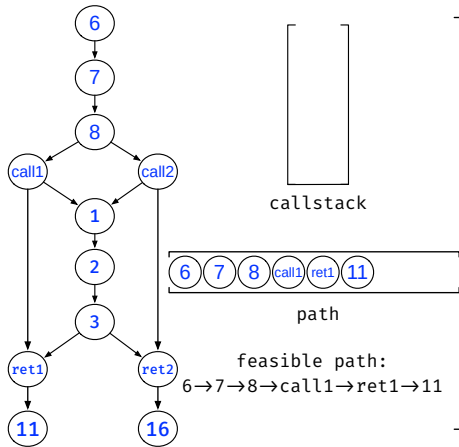
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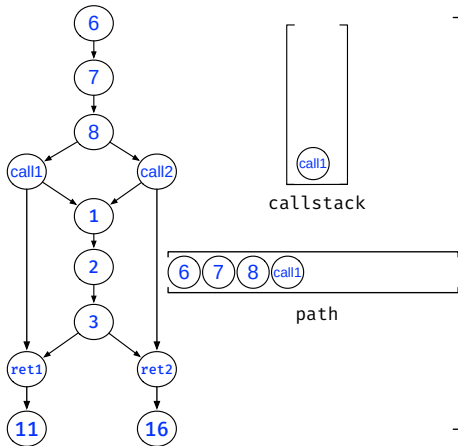
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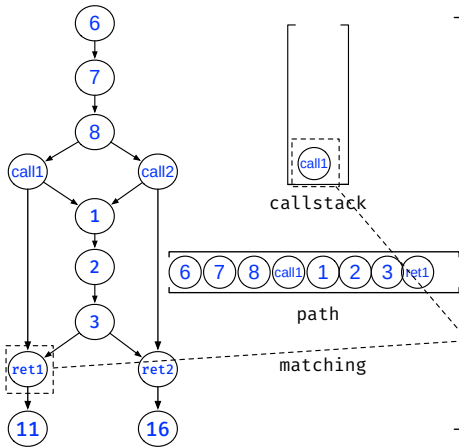
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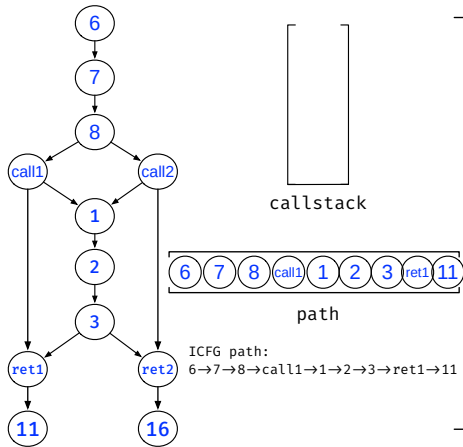
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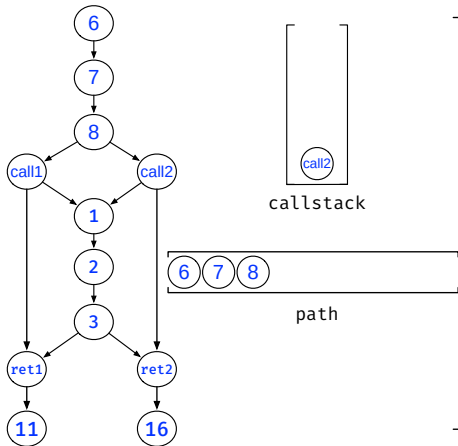
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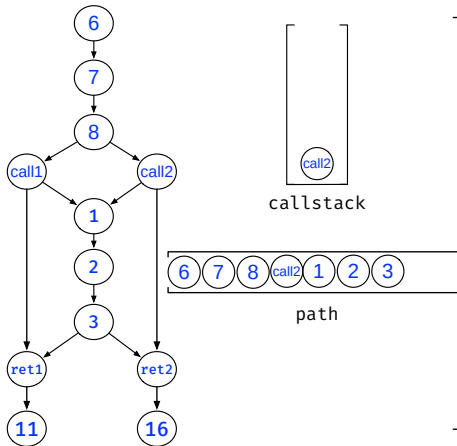
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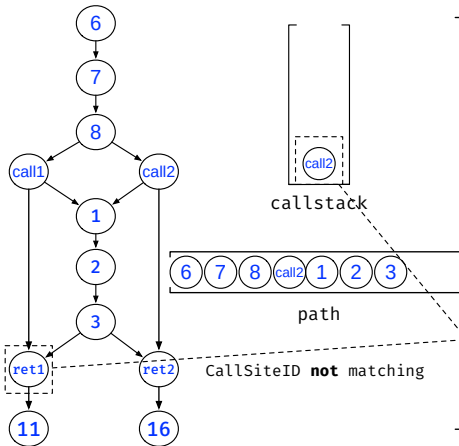
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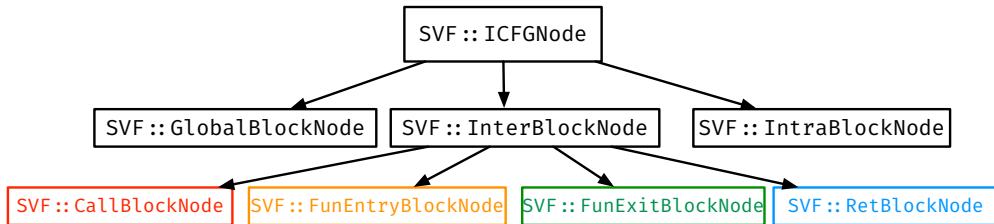
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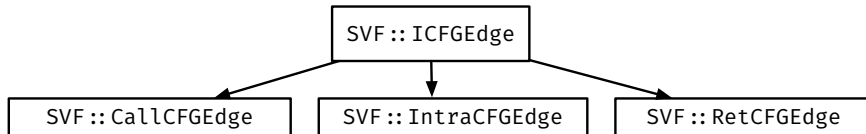
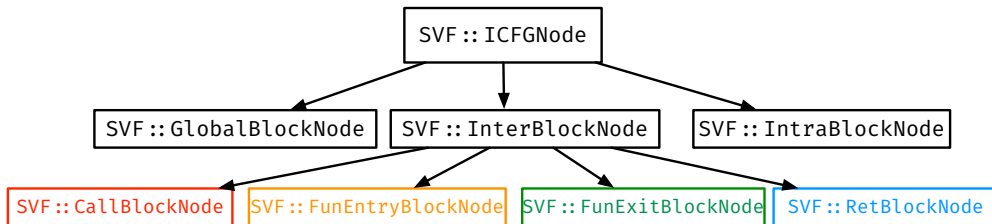
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ICFG Node and Edge Classes



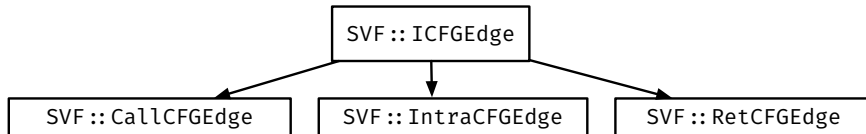
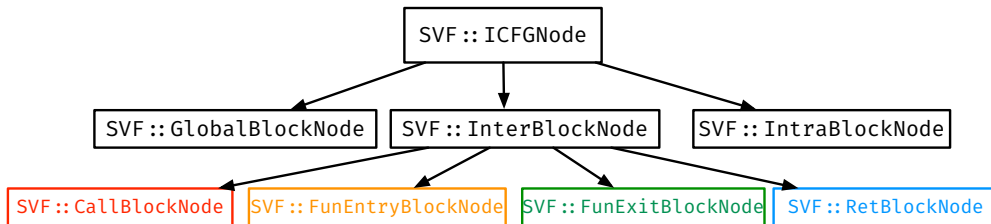
<https://github.com/SVF-tools/SVF/blob/master/include/Graphs/ICFGNode.h>

ICFG Node and Edge Classes



<https://github.com/SVF-tools/SVF/blob/master/include/Graphs/ICFGEde.h>

ICFG Node and Edge Classes



<https://github.com/svf-tools/SVF/wiki/Analyze-a-Simple-C-Program#4-interprocedural-control-flow-graph>

cast and dyn_cast

- C++ Inheritance: see slides in Week 2:.
- Casting a **parent** class pointer to pointer of a **Child** type:
 - `SVFUtil::cast`
 - Casting a pointer or reference to an instance of a specified class. This casting fails and abort the program if the object or reference is not the specified class at runtime.
 - `SVFUtil::dyn_cast`
 - "checking cast" operation. It checks to see if the operand is of the specified type, and if so, returns a pointer to it (this operator does not work with references). If the operand is not of the correct type, a null pointer is returned.
 - works very much like the `dynamic_cast<>` operator in C++, and should be used in the same circumstances.
- Example: Accessing the attributes of the child class via casting.
 - `RetBlockNode* retNode = SVFUtil::cast<RetBlockNode>(ICFGEEdge);`
 - `CallCFGEEdge* callNode = SVFUtil::dyn_cast<CallCFGEEdge>(ICFGEEdge);`