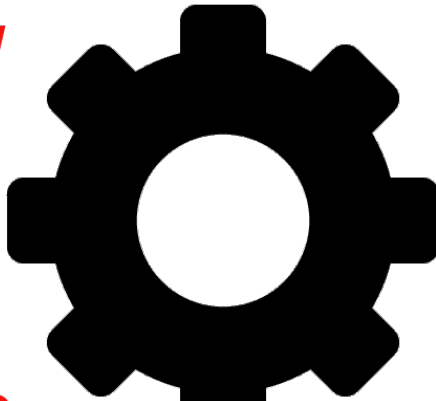


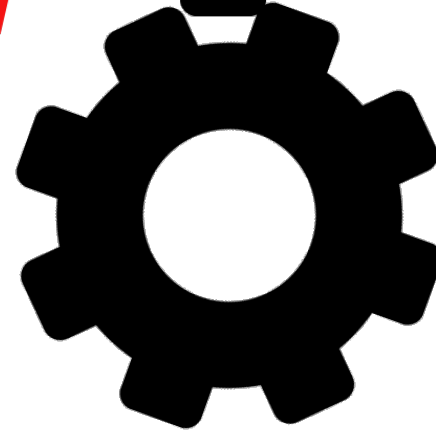
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LoopEnvironment

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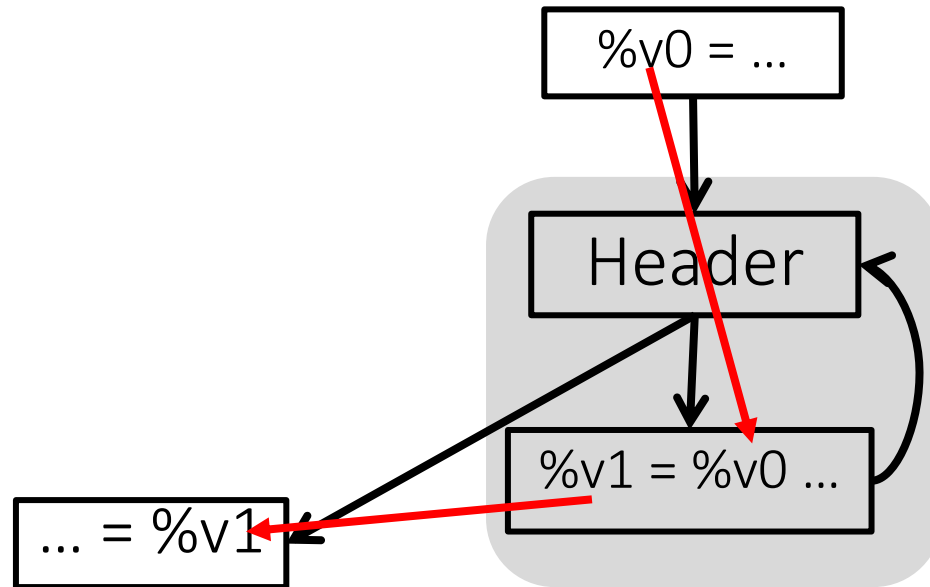


Outline

- What is it and why NOELLE provides it
- Live-In and Live-Out variables
- Producers and consumers

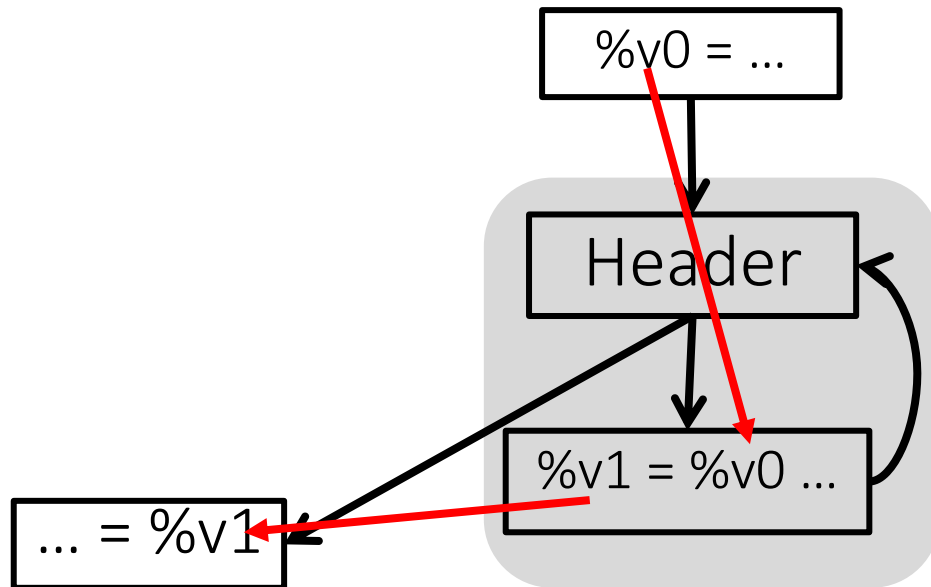
LoopEnvironment

- It captures the data-flows generated by writing and reading variables to and from a loop



LoopEnvironment

- It captures the data-flows generated by writing and reading variables to and from a loop



Index	Value	Type	Live-In ?
0	%v0	i64	True
1	%v1	i64	False

Outline

- What is it and why NOELLE provides it
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Live-In and Live-Out

```
/*  
 * Fetch the loop environment  
 */  
auto loopEnv = loop->getEnvironment();
```

Instance of the class `llvm::noelle::LoopDependenceInfo`



Instance of the class `llvm::noelle::LoopEnvironment`



Live-In and Live-Out

```
/*  
 * Fetch the loop environment  
 */  
auto loopEnv = loop->getEnvironment();
```

```
/*  
 * Iterate over live-in values  
 */  
errs() << "  Live-In values:\n";  
for (auto liveInIndex : loopEnv->getEnvIDsOfLiveInVars()){  
  auto p = loopEnv->getProducer(liveInIndex);  
  errs() << "    Index " << liveInIndex << ": " << *p << "\n";  
}
```

```
/*  
 * Iterate over live-out values  
 */  
errs() << "  Live-Out values:\n";  
for (auto liveOutIndex : loopEnv->getEnvIDsOfLiveOutVars()){  
  auto p = loopEnv->getProducer(liveOutIndex);  
  errs() << "    Index " << liveOutIndex << ": " << *p << "\n";  
}
```

Outline

- What is it and why NOELLE provides it
- Live-In and Live-Out variables
- Producers and consumers

Producers and consumers

Elements that compose the environment have producers and consumers

- Producers: instructions that define variables that compose the environment
- Consumers: instructions that use variables that compose the environment

```
/*  
 * Iterate over producers of the elements of the environment.  
 */  
errs() << " Producers of the elements in the environment of the loop:\n";  
for (auto liveInOrOutValue : loopEnv->getProducers()) {  
    errs() << "    " << *liveInOrOutValue << "\n";  
}
```

How many producers per environment element?

1 because the IR is in SSA

Producers and consumers

Elements that compose the environment have producers and consumers

- Producers: instructions that define variables that compose the environment
- Consumers: instructions that use variables that compose the environment

```
/*  
 * Iterate over producers of the elements of the environment.  
 */  
errs() << " Producers of the elements in the environment of the loop:\n";  
for (auto liveInOrOutValue : loopEnv->getProducers()) {  
    errs() << "    " << *liveInOrOutValue << "\n";  
}  
  
/*  
 * Iterate over consumers of live-out values  
 */  
errs() << "    Consumers of live-Out values:\n";  
for (auto liveOutIndex : loopEnv->getEnvIDsOfLiveOutVars()){  
    auto p = loopEnv->getProducer(liveOutIndex);  
    errs() << "        Index " << liveOutIndex << ": " << *p << "\n";  
    for (auto c : loopEnv->consumersOf(p)){  
        errs() << "            Consumer = " << *c << "\n";  
    }  
}
```

Always have faith in your ability

Success will come your way eventually

Best of luck!