# Exploring Large Profiles with Calling Context Ring Charts

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# Profiling

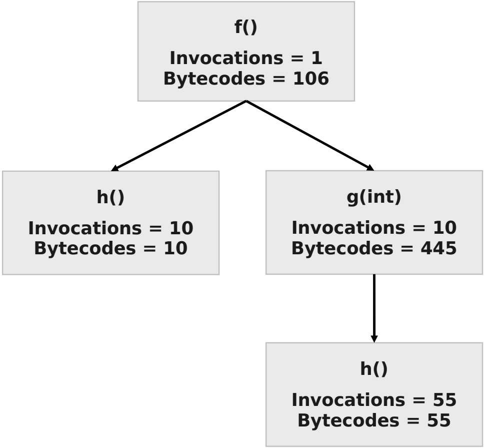
- Analysis of program behavior
- Detection of hot spots
- Calling context profiling
    - Dynamic metrics for each calling context
    - Data structure: Calling Context Tree (CCT)

# Calling Context Tree (CCT)

```
void f() {
  int i;
  for (i=1;i<=10;++i) {
    h();
    g(i);
  }
}

void g(int i) {
  int j;
  for (j=1;j<=i;++j) {
    h();
  }
}

void h() { return; }
```



f()

Invocations = 1
Bytecodes = 106

h()

Invocations = 10
Bytecodes = 10

g(int)

Invocations = 10
Bytecodes = 445

h()

Invocations = 55
Bytecodes = 55

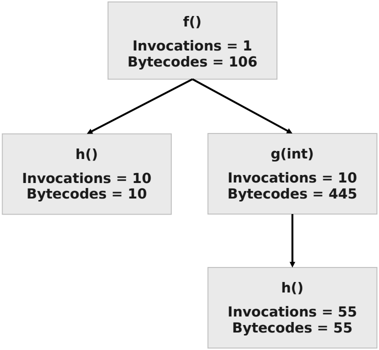
# Problem Statement

- CCTs for typical applications can be huge
  - Up to millions of nodes
  - Maximal depth up to 450
- Need a way to present the data to the developer
  - Support for exploring deep trees
  - Locate hot spots

# Space Filling Visualiaztion Techniques

- Treemaps
  - Rectangular layout
  - 100 % space utilization
  - Size can be proportionnal to a metric for each represented node
  - Limited representation of hierarchy
- Calling Context Ring Charts (CCRC)
  - Circular layout, similar to Sunburst
  - Navigation by changing the root node
  - Hierarchy is well visualized
  - Zooming (changing tree depth)

# CCRC



f()

Invocations = 1
Bytecodes = 106

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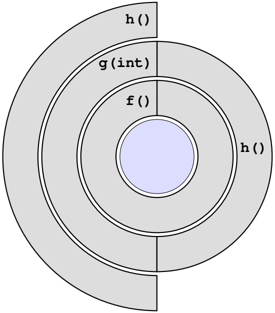
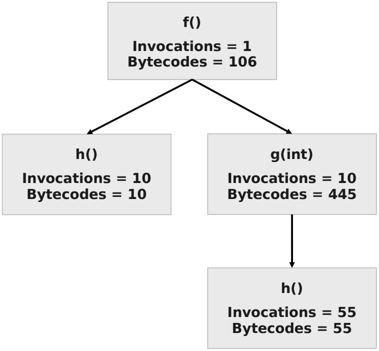
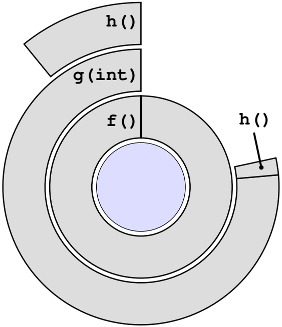
Nodes of equal size



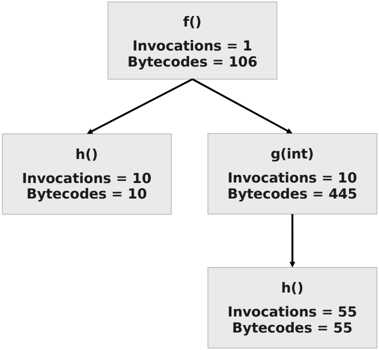
# CCRC



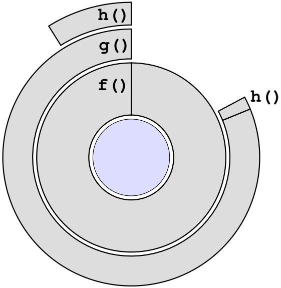
Angle proportional to bytecode consumption



# CCRC



Angle and area proportional to bytecode consumption



# Demo

Setting :

- Aspect for CCT creation
- Number of executed bytecodes as metric
- Incremental updates sent every second through a socket
- Display is updated when an update packet is received

# Demo

. . .

# Conclusion

- Hierarchy represented using a circular layout
- Exploration of the tree by changing the root node
- Size of the segment according to a metric helps locating hotspots
- Future Work
  - Use a color scheme to represent additional data (other metrics, . . . )
  - Add an advanced search mechanism