Research Report

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review of the issues to solve/What I needed to do

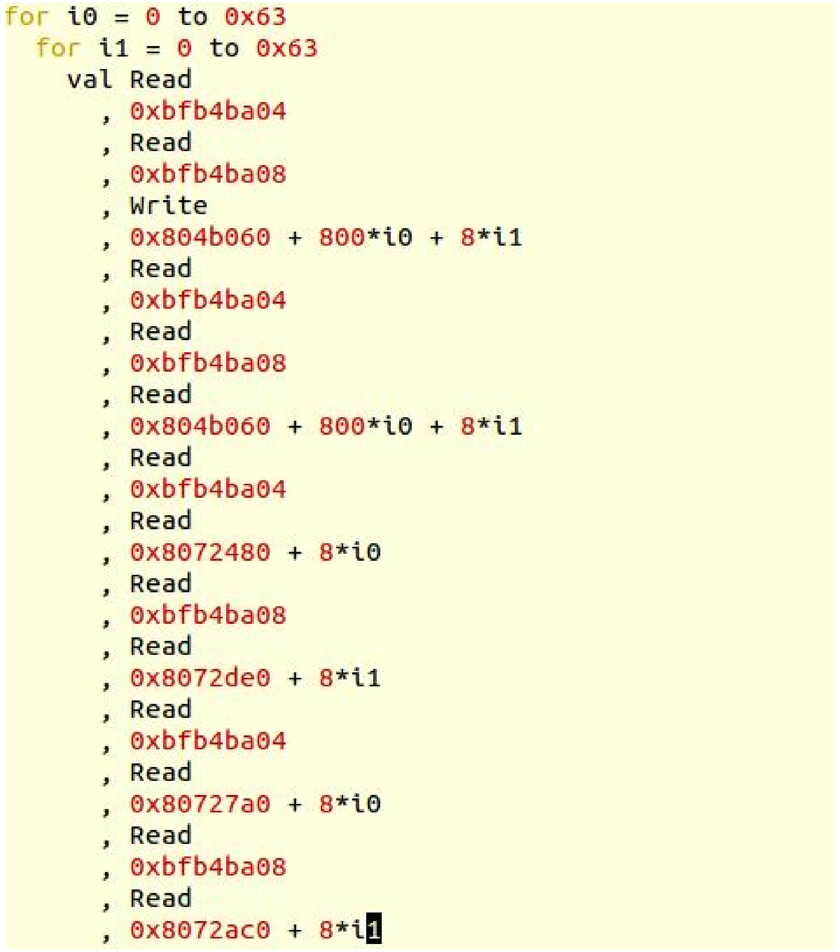
- Needed to know how existing programs perform the memory/dependency analysis
- Needed to reconstruct loops and array accesses from the trace only
- Others
  - Lulesh (using INRIA PPCG)
  - PNNL benchmark

Progress

- Reconstruct from the trace
  - With the help of Prof Ketterlin's Nested Loop Recognizer (NLR)
  - Change the format of NLR output to SCoP output (example shown in next slides)
  - Fake the operators because it does not affect dependency analysis!
  - Dump the SCoP with PoCC standard process flow: the SCoP (constructed from trace and NLR) ---> clan ----> candl

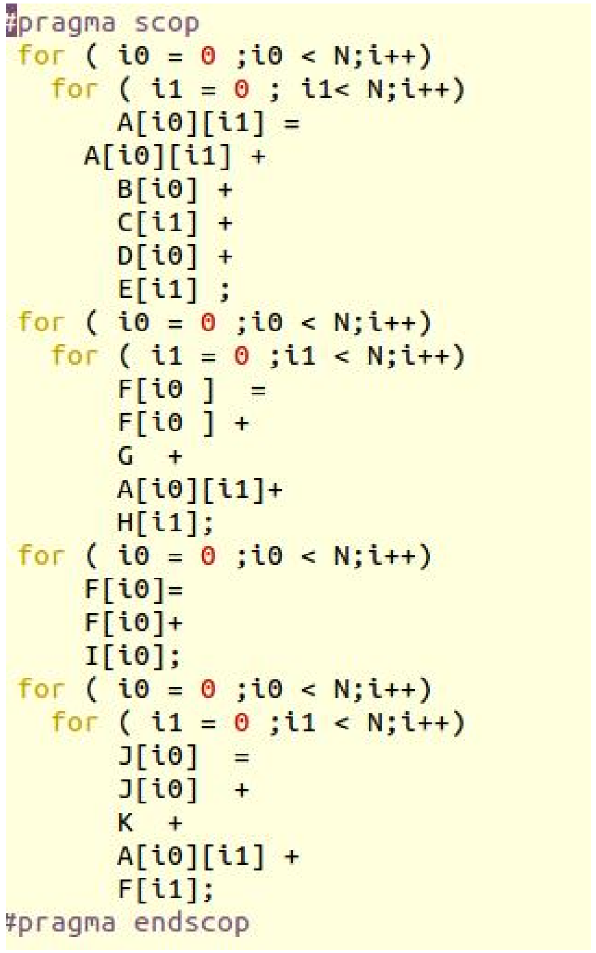
Generate SCoP from Trace (without knowing the source)

NLR, only one loop nest;



```
for i0 = 0 to 0x63
  for i1 = 0 to 0x63
    val Read
      , 0xbfb4ba04
      , Read
      , 0xbfb4ba08
      , Write
      , 0x804b060 + 800*i0 + 8*i1
      , Read
      , 0xbfb4ba04
      , Read
      , 0xbfb4ba08
      , Read
      , 0x804b060 + 800*i0 + 8*i1
      , Read
      , 0xbfb4ba04
      , Read
      , 0x8072480 + 8*i0
      , Read
      , 0xbfb4ba08
      , Read
      , 0x8072de0 + 8*i1
      , Read
      , 0xbfb4ba04
      , Read
      , 0x80727a0 + 8*i0
      , Read
      , 0xbfb4ba08
      , Read
      , 0x8072ac0 + 8*i1
```

Target SCoP Code



```
#pragma scop
 for ( i0 = 0 ;i0 < N;i++)
   for ( i1 = 0 ; i1< N;i++)
       A[i0][i1] =
     A[i0][i1] +
       B[i0] +
       C[i1] +
       D[i0] +
       E[i1] ;
 for ( i0 = 0 ;i0 < N;i++)
   for ( i1 = 0 ;i1 < N;i++)
       F[i0 ]  =
       F[i0 ] +
       G  +
       A[i0][i1]+
       H[i1];
 for ( i0 = 0 ;i0 < N;i++)
     F[i0]=
     F[i0]+
     I[i0];
 for ( i0 = 0 ;i0 < N;i++)
   for ( i1 = 0 ;i1 < N;i++)
       J[i0]  =
       J[i0]  +
       K  +
       A[i0][i1] +
       F[i1];
#pragma endscop
```

The Plan

- Write the program that does the previous conversion
  - Modify NLR code to dump out the required array form and loop form.
  - Some post processing to get rid of loop iterator read