

LearSolve[] accelerating by Intel MKL

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Linear Solving

```
In[356]:= n = 5;  
A = Table[Random[Integer, {-100, 100}], {n}, {n}];  
X = Table[Random[Integer, {-100, 100}], {n}];  
v = A.X;  
  
In[365]:= MapThread[#1.{p, q, r, s, t} == #2 &, {A, v}] // TableForm
```

```
Out[365]/TableForm=  
-24 p - 47 q - 81 r + 69 s - 45 t == -11 802  
-17 p + 17 q - 62 r - 97 s - 76 t == -6872  
-19 p - 10 q + 25 r + 95 s - 26 t == 501  
30 p + 63 q - 10 r - 57 s - 26 t == 2088  
-82 p + 81 q - 23 r + 61 s - 63 t == 1586
```

```
In[361]:= LinearSolve[A, v]
```

```
Out[361]= {-10, 66, 87, -2, 39}
```

Linear Solving with Intel MKI(multi threading BLAS) for 7000 variables

```
n = 7000;  
A = Table[Random[Integer, {-100, 100}], {n}, {n}];  
X = Table[Random[Integer, {-100, 100}], {n}];  
v = A.X;
```

■ results at TSUBAME(16 cores/node)

```
In[378]:= threads = {1, 2, 4, 8, 12, 15, 16};  
cpus100 = {76.3994, 42.5935, 25.3052, 17.5713, 16.3915, 15.0, 14.6558};
```

```
In[400]:= ListPlot[Thread[{threads, cpus100}], AxesOrigin -> {1, 0},  
PlotRange -> {{1, 16}, {0, 80}}, AxesLabel -> {"Threads", "Second"},  
PlotJoined -> True, PlotLabel -> StyleForm["LinearSolve[] with IntelMKL for n=7000",  
FontSize -> 12, FontWeight -> "Bold"], Background -> GrayLevel[.8]]
```

