

Rollups benchmarks

Benchmarking exec units as a function of “update length”

Preamble

```
In[1]:= SetDirectory[NotebookDirectory[]];
```

Reference protocol parameters (June 2023)

```
In[2]:= maxExSteps = 10 000 000 000;  
maxExMem = 14 000 000;
```

Import benchmark data

```
In[4]:= data = Import["rollupBench_1.csv", "CSV"];
```

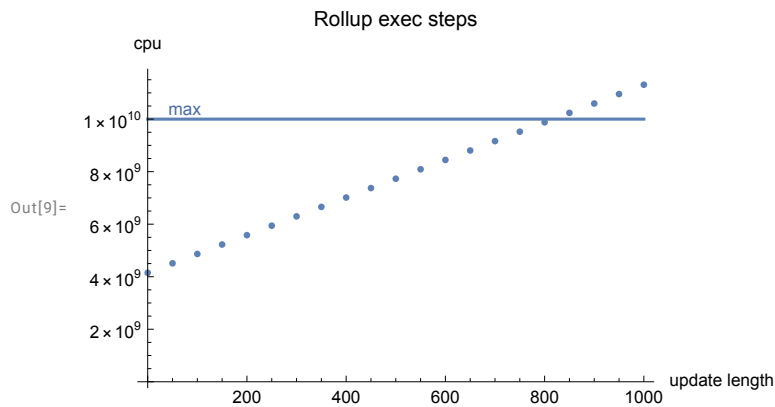
Data analysis

CPU

```
In[5]:= cpuData = {#[[1]], #[[2]]} & /@ data  
Out[5]= {{0, 4 150 154 154}, {50, 4 509 772 574}, {100, 4 866 199 304},  
         {150, 5 225 817 724}, {200, 5 582 244 454}, {250, 5 941 862 874}, {300, 6 298 289 604},  
         {350, 6 657 908 024}, {400, 7 014 334 754}, {450, 7 373 953 174}, {500, 7 730 379 904},  
         {550, 8 089 998 324}, {600, 8 446 425 054}, {650, 8 806 043 474}, {700, 9 162 470 204},  
         {750, 9 522 088 624}, {800, 9 878 515 354}, {850, 10 238 133 774},  
         {900, 10 594 560 504}, {950, 10 954 178 924}, {1000, 11 310 605 654}}
```

Data plot (CPU)

```
In[6]:= ListPlot[cpuData, PlotRange → All,
  PlotLabel → "Rollup exec steps", AxesLabel → {"update length", "cpu"}];
Plot[maxExSteps, {x, 0, First@Last[cpuData]}];
Graphics[Text[Style["max", Blue], {75, maxExSteps}, {0, -1}]];
cpuPlot = Show[%%, %, %]
```



Reaching maximum budget

```
In[10]:= FindRoot[Interpolation[cpuData][ul] == maxExSteps, {ul, 40}]
Out[10]= {ul → 816.896}
```

∴ CPU budget is exceeded when *update length* is ≥ 817 .

Linear model

```
In[11]:= Fit[cpuData, {1, ul}, ul]
Out[11]= 4.15091 × 109 + 7.16045 × 106 ul
```

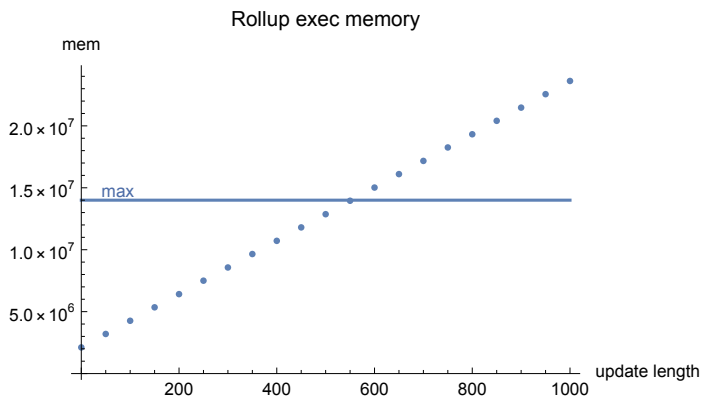
Memory

```
In[12]:= memData = {#[[1]], #[[3]]} & /@ data
Out[12]= {{0, 2 111 935}, {50, 3 197 535}, {100, 4 263 135}, {150, 5 348 735}, {200, 6 414 335},
  {250, 7 499 935}, {300, 8 565 535}, {350, 9 651 135}, {400, 10 716 735},
  {450, 11 802 335}, {500, 12 867 935}, {550, 13 953 535}, {600, 15 019 135},
  {650, 16 104 735}, {700, 17 170 335}, {750, 18 255 935}, {800, 19 321 535},
  {850, 20 407 135}, {900, 21 472 735}, {950, 22 558 335}, {1000, 23 623 935}}
```

Data plot (memory)

```
In[13]:= ListPlot[memData, PlotRange → All,
  PlotLabel → "Rollup exec memory", AxesLabel → {"update length", "mem"}];
Plot[maxExMem, {x, 0, First@Last[cpuData]}];
Graphics[Text[Style["max", Blue], {75, maxExMem}, {0, -1}]];
memPlot = Show[%%, %, %]
```

Out[16]=



Reaching maximum budget

```
In[17]:= FindRoot[Interpolation[memData][ul] == maxExMem, {ul, 40}]
```

Out[17]=

```
{ul → 552.174}
```

∴ Memory budget is exceeded when *update length* is ≥ 553 .

Linear model

```
In[18]:= Fit[memData, {1, ul}, ul]
```

Out[18]=

```
 $2.1167 \times 10^6 + 21512. \text{ ul}$ 
```

Conclusion

To be within exec units budget, *update length* must be 552 or less.

