Rollups benchmarks

Benchmarking exec units as a function of “update length”

Preamble

In[183]:=

```
SetDirectory[NotebookDirectory[]];
```

Reference protocol parameters (June 2023)

In[184]:=

```
maxExSteps = 10 000 000 000;
maxExMem = 14 000 000;
```

Import benchmark data

In[186]:=

```
data = Import["rollupBench_2.csv", "CSV"];
```

Data analysis

CPU

In[187]:=

```
cpuData = {#[[1]], #[[2]]} & /@ data
```

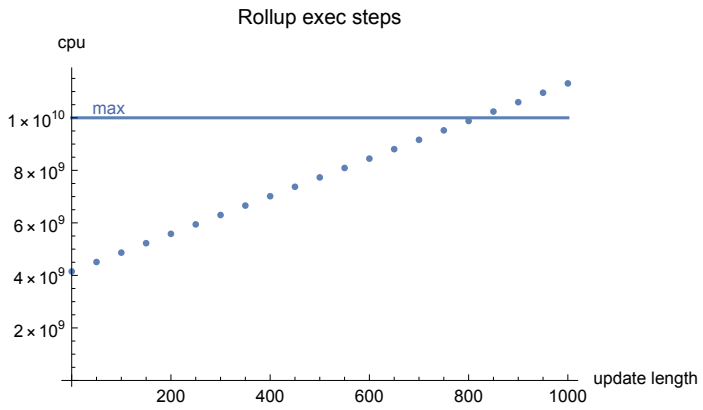
Out[187]=

```
{{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[188]:=
```
ListPlot[cpuData, PlotRange → All,
  PlotLabel → "Rollup exec steps", AxesLabel → {"update length", "cpu"}];
Plot[maxExSteps, {x, 0, First@Last[cpuData]}];
Graphics[Text[Style["max", ■], {75, maxExSteps}, {0, -1}]];
cpuPlot = Show[%%%, %%, %]
```

Out[191]=



Reaching maximum budget

In[192]:=
```
FindRoot[Interpolation[cpuData][ul] == maxExSteps, {ul, 40}]
```

Out[192]=
```
{ul → 816.896}
```

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

Linear model

In[193]:=
```
Fit[cpuData, {1, ul}, ul]
```

Out[193]=
```
4.15091 × 10^9 + 7.16045 × 10^6 ul
```

Memory

In[194]:=
```
memData = {#[[1]], #[[3]]} & /@ data
```

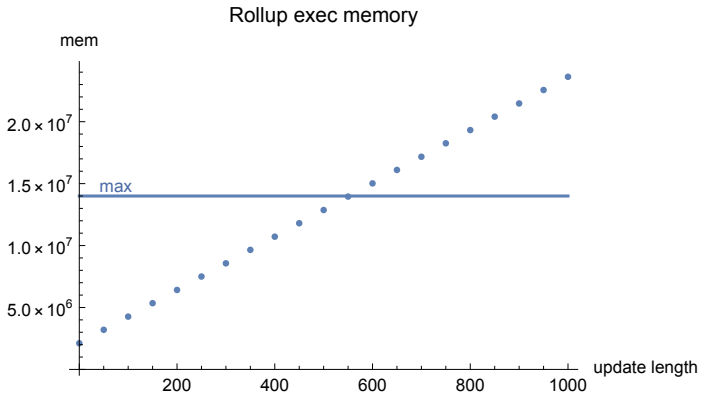
Out[194]=
```
{{0, 2 111 935}, {50, 3 197 535}, {100, 4 263 135}, {150, 5 348 735}, {200, 6 414 335},
 {250, 7 499 935}, {300, 8 565 535}, {350, 9 651 135}, {400, 10 716 735},
 {450, 11 802 335}, {500, 12 867 935}, {550, 13 953 535}, {600, 15 019 135},
 {650, 16 104 735}, {700, 17 170 335}, {750, 18 255 935}, {800, 19 321 535},
 {850, 20 407 135}, {900, 21 472 735}, {950, 22 558 335}, {1000, 23 623 935}}
```

Data plot (memory)

In[195]:=

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

Out[198]=



Reaching maximum budget

In[199]:=

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

Out[199]=

```
{ul → 552.174}
```

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

Linear model

In[200]:=

```
Fit[memData, {1, ul}, ul]
```

Out[200]=

$$2.1167 \times 10^6 + 21\,512.\ ul$$

Conclusion

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