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

In[2]:=
```
(*Load core activity, converting all date/times into DateObjects*)
```

In[3]:=
```
coreActivity = Import["activity.tsv", "TSV"];
coreActivity[[Range[2, Length[coreActivity]], 3]] =
 (DateObject[StringDrop[#, -8]] &) /@
  coreActivity[[Range[2, Length[coreActivity]], 3]];
coreActivity[[Range[2, Length[coreActivity]], 4]] =
 (DateObject[StringDrop[#, -8]] &) /@
  coreActivity[[Range[2, Length[coreActivity]], 4]];
```

In[4]:=
```
startTime = Sort[coreActivity[[Range[2, Length[coreActivity]], 3]]][[1]]
```

Out[4]= Sun 29 Nov 2015 12:55:00

In[5]:=
```
endTime = Reverse[Sort[coreActivity[[Range[2, Length[coreActivity]], 4]]]][[1]]
```

Out[5]= Fri 4 Dec 2015 18:23:00

In[6]:=
```
UnitConvert[endTime - startTime, MixedRadix["Days", "Hours", "Minutes", "Seconds"]]
```

Out[6]= $5\,\text{days}\ 5\,\text{h}\ 28\,\text{min}\ 6.82121 \times 10^{-12}\,\text{s}$

In[7]:=
```
(*Exclude job flows that failed to start from prep activity*)
```

In[8]:=
```
prepActivity = Select[
   coreActivity[[Range[2, Length[coreActivity]]]], #[[2]] == "prep" && #[[8]] == 0 &];
```

In[9]:=
```
alignActivity = Select[coreActivity[[Range[2, Length[coreActivity]]]],
   #[[2]] == "align" && #[[8]] == 0 &];
```

In[10]:=
```
prepPiece = Total[Piecewise[{{1, QuantityMagnitude[#[[3]] - startTime] ≤ x ≤
           QuantityMagnitude[#[[4]] - startTime]}}] & /@ prepActivity] * 80;
```

In[11]:=
```
alignPiece = Total[Piecewise[{{1, QuantityMagnitude[#[[3]] - startTime] ≤ x ≤
           QuantityMagnitude[#[[4]] - startTime]}}] & /@ alignActivity] * 2560;
```

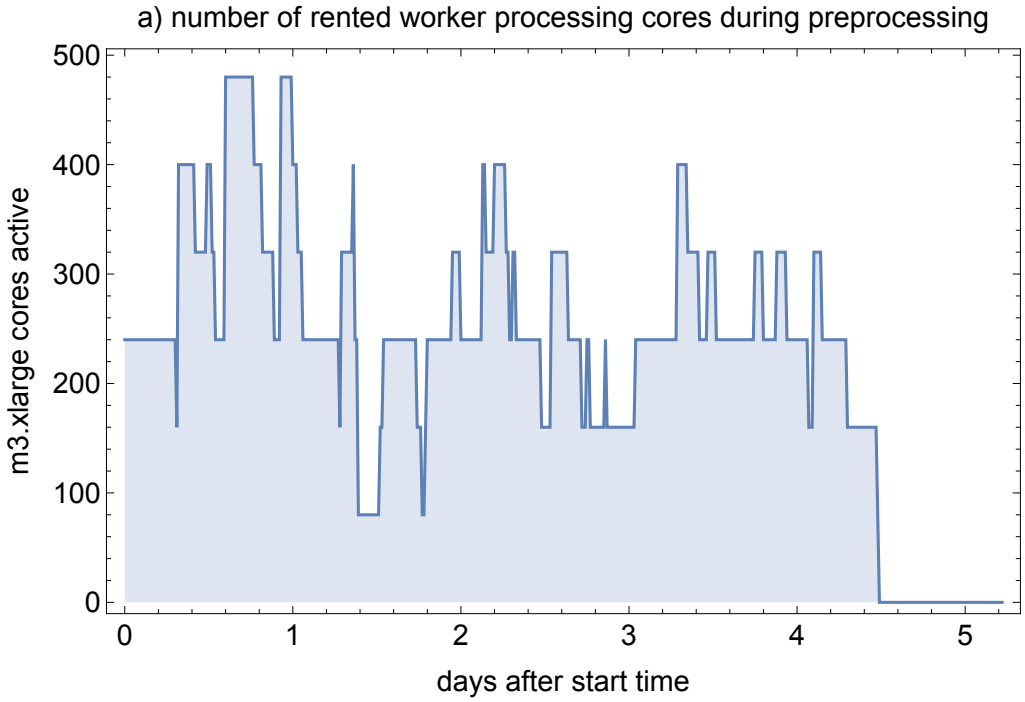
In[12]:=
```
(*First plot is of number of active cores in time during preprocess job flows;
second plot is of number of active cores in time during align job flows*)
```

In[13]:=
```
interval = .01;
dateRange = Range[0, QuantityMagnitude[endTime - startTime], interval];
```

In[14]:=
```
imagePadding = {{70, 30}, {50, 30}};
```

In[15]:=
```
prepPlot = ListPlot[Transpose[{dateRange, (prepPiece /. x → #) & /@ dateRange}],
  Joined → True, Filling → Axis, BaseStyle → {FontName → "Helvetica", FontSize → 15},
  Frame → True, ImageSize → Large, ImagePadding → imagePadding,
  FrameLabel → {{"m3.xlarge cores active", ""}, {"days after start time",
     "a) number of rented worker processing cores during preprocessing"}}]
```

Out[15]=

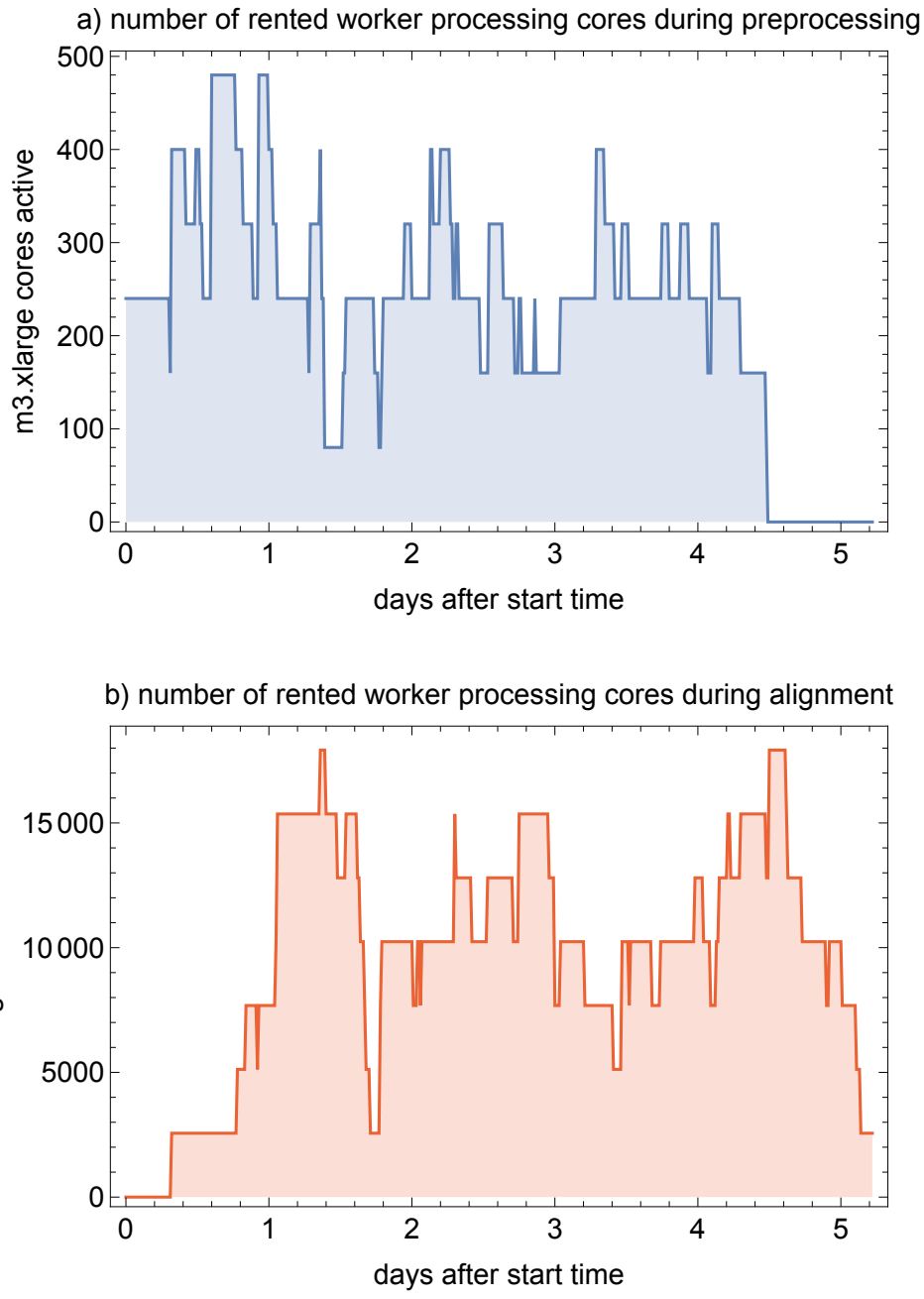


In[16]:=
```
alignPlot = ListPlot[Transpose[{dateRange, (alignPiece /. x → #) & /@ dateRange}],
  Joined → True, Filling → Axis, BaseStyle → {FontName → "Helvetica", FontSize → 15},
  Frame → True, ImageSize → Large, ImagePadding → imagePadding,
  PlotStyle -> ColorData[97, "ColorList"][[4]],
  FrameLabel → {{"c3.8xlarge cores active", ""}, {"days after start time",
     "b) number of rented worker processing cores during alignment"}}]
```

Out[16]=

In[17]:=
```
corePlot = GraphicsGrid[{{prepPlot}, {alignPlot}}, ImageSize → Large]
```

Out[17]=



In[18]:=
```
Export["cores.pdf", corePlot]
```

Out[18]=
```
cores.pdf
```

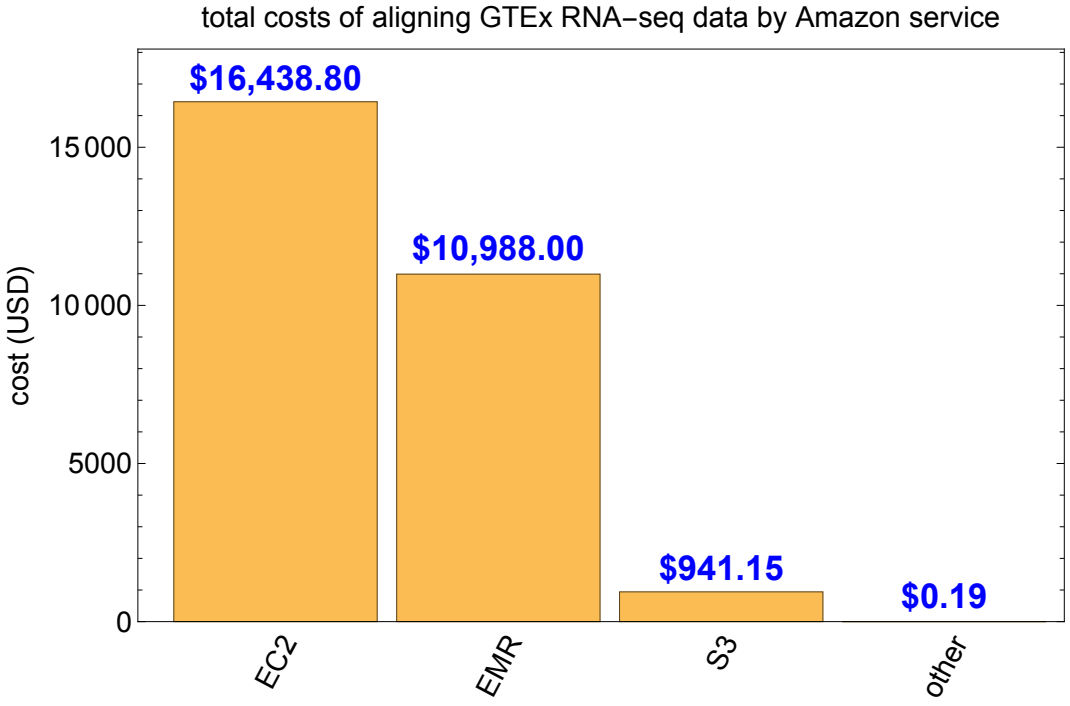
In[19]:=
```
costs = Import["costs.csv", "CSV"]
```

Out[19]=
```
{{Service, Amazon Elastic Compute Cloud,
  Amazon Elastic MapReduce, Amazon Simple Storage Service,
  Amazon Simple Queue Service, Amazon SimpleDB, Daily Total},
 {Service Total, 16 438.8, 10 988., 941.147, 0.188414, 0.00032373, 28 368.1},
 {2015-12-04, 3540.01, 2447.88, 259.38, 0.0584892, 0.00007988, 6247.33},
 {2015-12-03, 2978.24, 2070.72, 269.756, 0.0440118, 0.00008047, 5318.76},
 {2015-12-02, 3543.74, 2617.14, 182.314, 0.0576925, 0.00007993, 6343.25},
 {2015-12-01, 4120.24, 2513.98, 189.469, 0.00480737, 0., 6823.69},
 {2015-11-30, 2256.6, 1338.27, 40.228, 0.0234128, 0.00008345, 3635.12}}
```

In[20]:=
```
data = costs[[2, Range[2, 4]]];
data = Append[data, costs[[2, 5]] + costs[[2, 6]]];
labels = {"EC2", "EMR", "S3", "other"};
```

In[22]:=
```
costPlot =
 Show[BarChart[data, ChartLabels → Placed[labels, Below, Rotate[#, Pi / 2.9] &],
   BaseStyle → {FontName → "Helvetica", FontSize → 15, Black},
   ImageSize → Large, Frame → True, FrameLabel → {{"cost (USD)", ""},
     {"", "total costs of aligning GTEx RNA-seq data by Amazon service"}},
   FrameTicks → {None, True}], Graphics[
   Text[Style["$16,438.80", Bold, Blue, FontSize → 18], {1, 17 200}]],
  Graphics[Text[Style["$10,988.00", Bold, Blue, FontSize → 18], {2, 11 800}]],
  Graphics[Text[Style["$941.15", Bold, Blue, FontSize → 18], {3, 1700}]],
  Graphics[Text[Style["$0.19", Bold, Blue, FontSize → 18], {4, 800}]],
  ImageSize → Large]
```

Out[22]=



In[23]:=
```
Export["costs.pdf", costPlot]
```

Out[23]=
```
costs.pdf
```