

Do vs. Map/MapThread

(c)Symbolic Systems (2009.7.5)

Finding a Max among 2000*2000 array

```
In[1]:= n = 2000;
M = Table[Random[Integer, {1, 1 000 000}], {n}, {n}];

In[3]:= maxproc := Module[{max, m, n, i, j},
  max = M[[1, 1]];
  {m, n} = Dimensions[M];
  Do[If[max < M[[i, j]], max = M[[i, j]], {i, 1, m}, {j, 1, n}];
  max]

In[4]:= AbsoluteTiming[maxproc]
Out[4]= {4.859833, 1 000 000}

In[5]:= AbsoluteTiming[Max[Flatten[M]]]
Out[5]= {0.006932, 1 000 000}
```

Applying a function f to all element of list, n=10000

```
In[6]:= m = Table[1, {10 000}];
Timing[
  L = {};
  Do[AppendTo[L, f[Part[m, i]]], {i, 1, Length[m]}];
  L;]
Out[7]= {3.01239, Null}

In[8]:= Timing[
  Map[f, m];
]
Out[8]= {0.003461, Null}
```

Adding a $\{0,1\}$, $\{1,0\}$, $\{1,1\}$ indexed elements to itself

■ Preliminaries

```
In[9]:= n = 10;
(m = Partition[Range[n * n], n]) // MatrixForm
```

```
Out[10]//MatrixForm=
( 1  2  3  4  5  6  7  8  9  10
 11 12 13 14 15 16 17 18 19 20
 21 22 23 24 25 26 27 28 29 30
 31 32 33 34 35 36 37 38 39 40
 41 42 43 44 45 46 47 48 49 50
 51 52 53 54 55 56 57 58 59 60
 61 62 63 64 65 66 67 68 69 70
 71 72 73 74 75 76 77 78 79 80
 81 82 83 84 85 86 87 88 89 90
 91 92 93 94 95 96 97 98 99 100 )
```

```
In[11]:= Do[
  m[[i, j]] = m[[i, j]] + m[[i, j + 1]] + m[[i + 1, j]] + m[[i + 1, j + 1]],
  {i, 1, n - 1}, {j, 1, n - 1}]
```

```
In[12]:= Drop[m, -1, -1] // MatrixForm
```

```
Out[12]//MatrixForm=
( 26  30  34  38  42  46  50  54  58
 66  70  74  78  82  86  90  94  98
106 110 114 118 122 126 130 134 138
146 150 154 158 162 166 170 174 178
186 190 194 198 202 206 210 214 218
226 230 234 238 242 246 250 254 258
266 270 274 278 282 286 290 294 298
306 310 314 318 322 326 330 334 338
346 350 354 358 362 366 370 374 378 )
```

```
In[13]:= n = 10;
m = Partition[Range[n * n], n];
(m = PadRight[PadRight[m, {-n - 1, -n - 1}], {n + 2, n + 2}]) // MatrixForm
```

```
Out[15]//MatrixForm=
( 0  0  0  0  0  0  0  0  0  0  0
 0  1  2  3  4  5  6  7  8  9  10  0
 0  11 12 13 14 15 16 17 18 19 20  0
 0  21 22 23 24 25 26 27 28 29 30  0
 0  31 32 33 34 35 36 37 38 39 40  0
 0  41 42 43 44 45 46 47 48 49 50  0
 0  51 52 53 54 55 56 57 58 59 60  0
 0  61 62 63 64 65 66 67 68 69 70  0
 0  71 72 73 74 75 76 77 78 79 80  0
 0  81 82 83 84 85 86 87 88 89 90  0
 0  91 92 93 94 95 96 97 98 99 100  0
 0  0  0  0  0  0  0  0  0  0  0 )
```

```
In[16]:= (m = MapThread[Plus, RotateRight[m, #] & /@ {{0, 0}, {0, 1}, {1, 0}, {1, 1}}]) // MatrixForm
```

```
Out[16]//MatrixForm=
```

```
( 0  0  0  0  0  0  0  0  0  0  0  0 )
( 0  1  3  5  7  9  11 13 15 17 19 10 )
( 0 12 26 30 34 38 42 46 50 54 58 30 )
( 0 32 66 70 74 78 82 86 90 94 98 50 )
( 0 52 106 110 114 118 122 126 130 134 138 70 )
( 0 72 146 150 154 158 162 166 170 174 178 90 )
( 0 92 186 190 194 198 202 206 210 214 218 110 )
( 0 112 226 230 234 238 242 246 250 254 258 130 )
( 0 132 266 270 274 278 282 286 290 294 298 150 )
( 0 152 306 310 314 318 322 326 330 334 338 170 )
( 0 172 346 350 354 358 362 366 370 374 378 190 )
( 0 91 183 185 187 189 191 193 195 197 199 100 )
```

```
In[17]:= Drop[Drop[m, 2, 2], -1, -1] // MatrixForm
```

```
Out[17]//MatrixForm=
```

```
( 26  30  34  38  42  46  50  54  58 )
( 66  70  74  78  82  86  90  94  98 )
(106 110 114 118 122 126 130 134 138 )
(146 150 154 158 162 166 170 174 178 )
(186 190 194 198 202 206 210 214 218 )
(226 230 234 238 242 246 250 254 258 )
(266 270 274 278 282 286 290 294 298 )
(306 310 314 318 322 326 330 334 338 )
(346 350 354 358 362 366 370 374 378 )
```

■ Timing

```
In[18]:= n = 1000;
m = Partition[Range[n * n], n];
Timing[
  Do[
    m[[i, j]] = m[[i, j]] + m[[i, j + 1]] + m[[i + 1, j]] + m[[i + 1, j + 1]], {i, 1, n - 1}, {j, 1, n - 1}];]
```

```
Out[20]= {5.00778, Null}
```

```
In[21]:= n = 1000;
m = Partition[Range[n * n], n];
Timing[
  m = PadRight[PadRight[m, {-n - 1, -n - 1}], {n + 2, n + 2}];
  m = MapThread[Plus, RotateRight[m, #] & /@ {{0, 0}, {0, 1}, {1, 0}, {1, 1}}];]
```

```
Out[23]= {0.080827, Null}
```