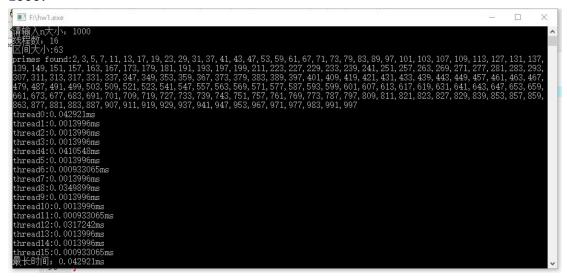
### 15331098 何子龙

注意事项:本程序使用了 openmp 库,为了能正常运行,应在编译选项中加上-fopenmp。另外,计时所采用的 api 是在 windows 运行环境下能使用的,其他运行环境下运行未确定是否会有某些突发情况。

实验结果:

#### 1000:



#### 2000:

```
### First Primer found: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 191, 191, 193, 197, 199, 211, 223, 227, 229, 223, 229, 241, 251, 257, 263, 269, 271, 277, 281, 283, 293, 307, 311, 231, 337, 331, 337, 347, 349, 582, 359, 367, 373, 379, 383, 389, 397, 401, 409, 419, 421, 431, 433, 439, 443, 449, 457, 461, 463, 467, 679, 487, 491, 499, 503, 509, 521, 523, 541, 547, 557, 563, 569, 571, 577, 587, 593, 599, 601, 607, 613, 617, 619, 631, 641, 643, 647, 653, 659, 661, 673, 677, 683, 997, 911, 919, 929, 937, 941, 947, 953, 967, 719, 977, 983, 991, 997, 1009, 1013, 1121, 1221, 2123, 1231, 1249, 1283, 287, 829, 839, 853, 857, 859, 863, 877, 881, 883, 877, 897, 911, 919, 929, 937, 941, 947, 953, 967, 197, 977, 983, 991, 997, 1009, 1013, 1019, 1121, 1031, 1033, 1039, 1049, 1051, 1061, 1062, 1069, 1087, 1091, 1092, 1031, 1093, 1097, 1103, 1109, 1117, 1123, 1129, 1121, 1133, 1129, 1127, 1249, 1259, 1259, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267, 1267,
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4000:

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primes found: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199, 211, 223, 227, 229, 233, 239, 241, 251, 257, 263, 269, 271, 277, 281, 283, 293, 307, 311, 317, 331, 337, 347, 349, 353, 359, 367, 373, 379, 383, 389, 397, 401, 409, 419, 421, 431, 433, 439, 443, 449, 457, 461, 463, 467, 479, 487, 491, 499, 503, 509, 521, 523, 541, 547, 557, 563, 569, 571, 577, 587, 593, 599, 601, 607, 613, 617, 619, 631, 641, 643, 647, 653, 659, 661, 673, 677, 683, 691, 701, 709, 719, 727, 733, 739, 743, 751, 757, 761, 769, 773, 787, 797, 809, 811, 821, 823, 827, 829, 839, 853, 857, 859, 863, 877, 881, 883, 887, 907, 911, 919, 929, 937, 941, 947, 953, 967, 971, 977, 983, 991, 997, 1009, 1013, 1019, 1021, 1031, 1033, 1039, 1049, 1051, 1061, 1063, 1069, 1087, 1091, 1093, 1097, 1103, 1109, 1117, 1123, 1129, 1151, 1153, 1163, 1171, 1181, 1187, 1193, 1201, 1213, 1217, 1223, 1229, 1231, 1237, 1249, 1259, 1277, 1279, 1283, 1289, 1291, 1297, 1301, 1303, 1307, 1319, 1321, 1327, 1361, 1367, 1373, 1381, 1399, 1409, 1423, 1427, 1429, 1433, 1439, 1447, 1451, 1453, 1459, 1471, 1481, 1483, 1487, 1489, 1493, 1499, 1511, 1523, 1531, 1543, 1549, 1553, 1559, 1567, 1571, 1579, 1583, 1597, 1601, 1607, 1613, 1619, 1621, 1627, 1637, 1657, 1663, 1667, 1669, 1693, 1697, 1699, 1709, 1721, 1723, 1733, 1741, 1747, 1753, 1759, 1777, 1783, 1787, 1789, 1801, 1811, 1823, 1813, 1847, 1861, 1867, 1669, 1693, 1697, 1699, 1709, 1721, 1723, 1733, 1741, 1747, 1753, 1759, 1777, 1783, 1787, 1789, 1801, 1811, 1823, 1831, 1847, 1861, 1867, 1669, 1693, 1697, 1699, 1709, 1721, 1723, 1733, 1741, 1747, 1753, 1759, 1777, 1783, 1787, 1789, 1801, 1811, 1823, 1831, 1847, 1861, 1867, 1669, 1693, 1697, 1699, 1709, 1721, 1723, 1733, 1741, 1747, 1753, 1759, 1777, 1783, 1787, 1789, 1893, 1997, 1999, 2003, 2011, 2017, 2027, 2029, 2039, 2053, 2063, 2063, 2069, 2081, 2082, 2089, 2099, 2111, 2113, 2129, 2131, 2137, 2141, 2143, 2153, 2154, 21
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## 显长时间; 0.0447871ms

#### 8000:

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primes found: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 29, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 181, 191, 192, 191, 223, 227, 229, 233, 239, 241, 251, 257, 263, 269, 271, 277, 281, 283, 293, 307, 311, 313, 317, 331, 337, 347, 349, 353, 359, 367, 373, 379, 383, 389, 397, 401, 409, 419, 419, 419, 413, 431, 431, 434, 449, 447, 461, 438, 447, 479, 487, 491, 499, 503, 509, 521, 523, 541, 547, 557, 563, 569, 571, 577, 587, 598, 599, 601, 607, 613, 617, 619, 631, 641, 643, 647, 653, 659, 661, 657, 677, 883, 611, 701, 709, 719, 727, 733, 739, 743, 751, 757, 761, 697, 773, 779, 780, 811, 812, 823, 827, 829, 828, 853, 857, 859, 863, 877, 881, 883, 887, 709, 119, 1919, 929, 937, 941, 947, 953, 967, 971, 977, 983, 991, 997, 1009, 1013, 1019, 1021, 1031, 1033, 1049, 1051, 1061, 1063, 1069, 1087, 1091, 1091, 1091, 1091, 1171, 1131, 1121, 1121, 1121, 1121, 1217, 1223, 1229, 1231, 1237, 1249, 1259, 1277, 1279, 1283, 1289, 1291, 1297, 1301, 1303, 1307, 1319, 1321, 1327, 1341, 1341, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 1431, 14
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### thread44:V.UU233266ms 最长时间; 1.06556ms

(以下开始因找到的质数过多只截图最大的那一部分) 16000: (因找到的质数过多只截图最大的那一部分):

```
, 11239, 11243, 11251, 11257, 11261, 11273, 11279, 11287, 11299, 11311, 11317, 11321, 11329, 11351, 11353, 11369, 11383, 11423, 114437, 114447, 114467, 11471, 11483, 11489, 11491, 11497, 11503, 11519, 11527, 11549, 11551, 11579, 11587, 11621, 11633, 11657, 11677, 11681, 11689, 11699, 11701, 11717, 11719, 11731, 11743, 11777, 11779, 11783, 11789, 11801, 11827, 11831, 11833, 11833, 11839, 11863, 11867, 11887, 11897, 11909, 11923, 11927, 11933, 11939, 11941, 11953, 11959, 11987, 12007, 12011, 12037, 12041, 12043, 12049, 12071, 12073, 12097, 12101, 12107, 12109, 12113, 12119, 12143, 12149, 12197, 12203, 12211, 12227, 12239, 12241, 12251, 12253, 12263, 12263, 12269, 12277, 12281, 12289, 12301, 12323, 12329, 12343, 12379, 12391, 12401, 12409, 12413, 12421, 12433, 12437, 12451, 12457, 12473, 12479, 12487, 12491, 12497, 12503, 12511, 12547, 12553, 12569, 12577, 12583, 12589, 12601, 12611, 12613, 12619, 12637, 12641, 12647, 12653, 12659, 12671, 12713, 12721, 12739, 12743, 12743, 12743, 12743, 12424, 12823, 12829, 12841, 12853, 12869, 12874, 12743, 12741, 12743, 12743, 12743, 12743, 12829, 128441, 12853, 12869, 12674, 12674, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12673, 12674, 12674, 12673, 12674, 12674, 12673, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 12674, 126
```

# 长时间; 0.0751117ms

32000: (因找到的质数过多只截图最大的那一部分):

```
2000: (因找到的质数过多只截图。大的那一部分):
,25969, 25981, 25999, 25999, 26003, 26017, 26021, 26029, 26041, 26053, 26083, 26099, 26107, 26111, 26113, 26119, 26141, 26153, 26177, 26183, 26189, 26209, 26227, 26237, 26249, 26251, 26261, 26261, 26263, 26297, 26293, 26297, 26309, 26317, 26321, 26339, 26377, 26589, 26597, 26597, 26597, 26597, 26597, 26597, 26597, 26597, 26597, 26597, 26597, 26597, 26647, 26643, 26641, 26647, 26643, 26643, 26648, 26649, 26459, 26479, 26489, 26497, 26501, 26513, 26571, 26723, 26759, 26777, 26733, 26801, 26813, 26831, 26832, 26839, 26834, 26863, 26699, 26701, 26711, 26713, 26717, 26723, 26793, 26987, 26995, 26991, 26997, 26987, 26995, 26991, 26997, 26987, 26995, 26991, 26997, 26987, 26995, 26991, 26997, 26987, 26995, 26991, 26997, 26170, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101, 27101,
```

最长时间; 3.3469ms

64000: (因找到的质数过多只截图最大的那一部分):

# 最长时间; 0.111968ms

### 128000: (因找到的质数过多只截图最大的那一部分):

# 长时间; 0.827628ms

### 256000: (因找到的质数过多只截图最大的那一部分):

56000: (因找到的质数过多只截图 最大的那一部分):

751, 250753, 250777, 250787, 250793, 250799, 250807, 250813, 250829, 250837, 250841, 250853, 250867, 250871, 250889, 250919, 1, 250963, 250967, 250969, 250979, 250999, 251903, 251003, 251033, 251051, 251057, 251059, 251063, 251071, 251081, 251087, 251099, 2, 251194, 2511171, 251177, 251179, 251191, 2511910, 251201, 251201, 251201, 251201, 251203, 251271, 251281, 251287, 251261, 25 251291, 251291, 251232, 251347, 251353, 251359, 251387, 251393, 251417, 251499, 251491, 251497, 251491, 251507, 2515191, 2515138, 251563, 251563, 2515641, 251601, 251607, 251609, 251611, 251621, 251623, 251639, 251671, 251701, 251707, 251737, 251761, 251789, 251791, 251893, 251417, 251893, 251875, 251861, 251879, 251879, 2518791, 251893, 251971, 251893, 251875, 2512639, 251879, 251879, 251877, 252163, 252169, 252169, 252169, 252169, 252167, 252163, 252169, 252169, 252171, 251893, 251875, 252169, 252169, 252169, 252169, 252167, 252163, 252169, 252173, 252181, 252209, 252223, 252233, 252233, 252237, 252283, 252289, 252313, 23, 252341, 252359, 252391, 252401, 252409, 252419, 2524049, 252449, 252457, 252463, 252481, 252509, 252233, 252837, 252887, 252889, 252897, 252881, 252897, 252881, 252897, 252881, 252897, 252897, 252893, 252371, 252773, 252771, 252731, 252737, 252767, 2527823, 252872, 252872, 252869, 252873, 25381, 253873, 2538049, 253049, 253061, 253067, 2535873, 253049, 253061, 253067, 2535873, 253067, 253507, 25350

### 最长时间; 0.193144ms

512000: (因找到的质数过多只截图最大的那一部分):

506083, 506101, 506113, 506119, 506131, 506147, 506171, 506173, 506183, 506201, 506213, 506251, 506263, 506269, 506281, 506291, 506327, 506299, 506333, 506339, 506347, 506351, 506357, 506531, 506533, 506339, 5065417, 506593, 506599, 506609, 506629, 506647, 506663, 506683, 506687, 506689, 506699, 506
729, 506731, 506743, 506773, 506783, 506791, 506797, 506809, 506837, 506843, 506873, 506837, 506883, 506899, 506903, 506919, 506791, 506791, 506791, 506791, 506791, 506791, 506791, 506791, 506791, 506791, 506791, 506793, 506791, 506791, 506791, 507979, 507109, 5071713, 507719, 507773, 507739, 507749, 507791, 507793, 507791, 507793, 507794, 507793, 507794, 507793, 507794, 507793, 507794, 507793, 507794, 507994, 507991, 507997, 509901, 509907, 509907, 509907, 509907, 509907, 509907, 509907, 509907, 509907, 509907, 509

#### umreaussr.0.0172017ms 最长时间; 0.243996ms

### 总结:

可见在处理数据按指数增长时,线程最长运行时间虽然有所增长,但也不是也按指数增长的,这是因为该程序在某种程度上已经实现了并行化了。线程最长运行时间的增长主要是在线程数增多后,各线程通信耗费时间增加等原因造成的。