Advanced practical Programming for Scientists

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Ex6 results

- **bip_2NrNnC.dat**: 28 rows, 26 cols, Checked. 67108864 vectors in 1.346 s = 49875.561 kvecs/s, Found 191100 feasible solutions.
- **bip_3E1gN5.dat**: 3 rows, 8 cols, Checked. 256 vectors in 0.000 s = 42666.667 kvecs/s, Found 8 feasible solutions.
- **bip_6csCZ3.dat**: 10 rows, 19 cols, Checked. 524288 vectors in 0.011 s = 46270.232 kvecs/s, Found 165186 feasible solutions.
- **bip_8hG0TA.dat**: 3 rows, 4 cols, Checked. 16 vectors in 0.000 s = 16000.000 kvecs/s, Found 4 feasible solutions.
- **bip_8kOEMA.dat**: 2 rows, 4 cols, Checked. 16 vectors in 0.000 s = 16000.000 kvecs/s, Found 4 feasible solutions.
- **bip_AYrhE1.dat**: 12 rows, 28 cols, Checked. 268435456 vectors in 3.047 s = 88103.368 kvecs/s, Found 123591 feasible solutions.
- **bip_BnF8SS.dat**: 11 rows, 21 cols, Checked. 2097152 vectors in 0.045 s = 46940.305 kvecs/s, Found 1068832 feasible solutions.
- **bip_EETzvD.dat**: 18 rows, 26 cols, Checked. 67108864 vectors in 1.627 s = 41253.463 kvecs/s, Found 1068832 feasible solutions.
- **bip_FNUjEn.dat**: 18 rows, 26 cols, Checked. 67108864 vectors in 1.631 s = 41139.735 kvecs/s, Found 1068832 feasible solutions.
- **bip_GAPHim.dat**: 22 rows, 26 cols, Checked. 67108864 vectors in 1.964 s = 34170.614 kvecs/s, Found 1068832 feasible solutions.
- **bip_KC9MBM.dat**: 68 rows, 29 cols, Checked. 536870912 vectors in 19.631 s = 27348.265 kvecs/s, Found 165120 feasible solutions.
- **bip_LqPgLR.dat**: 10 rows, 17 cols, Checked. 131072 vectors in 0.003 s = 43676.108 kvecs/s, Found 40866 feasible solutions.
- **bip_McODgq.dat**: 25 rows, 21 cols, Checked. 2097152 vectors in 0.049 s = 43060.901 kvecs/s, Found 4309375 feasible solutions.
- **bip_O0VIfY.dat**: 8 rows, 20 cols, Checked. 1048576 vectors in 0.019 s = 54853.317 kvecs/s, Found 364952 feasible solutions.
- **bip_QGRLK0.dat**: 15 rows, 23 cols, Checked. 8388608 vectors in 0.202 s = 41523.240 kvecs/s, Found 4309375 feasible solutions.
- **bip_Qxn7Yl1.dat**: 4 rows, 6 cols, Checked. 64 vectors in 0.000 s = 32000.000 kvecs/s, Found 14 feasible solutions.
- **bip_RScS67.dat**: 21 rows, 24 cols, Checked. 16777216 vectors in 0.368 s = 45630.187 kvecs/s, Found 419227 feasible solutions.
- **bip_VEqjNW.dat**: 29 rows, 29 cols, Checked. 536870912 vectors in 10.417 s = 51538.884 kvecs/s, Found 4309375 feasible solutions.
- **bip_W61lbL.dat**: 11 rows, 24 cols, Checked. 16777216 vectors in 0.357 s = 46976.318 kvecs/s, Found 175 feasible solutions.
- **bip_ZZvPi.e.dat**: 3 rows, 8 cols, Checked. 256 vectors in 0.000 s = 51200.000 kvecs/s, Found 175 feasible solutions.
- **bip_axUddE.dat**: 22 rows, 26 cols, Checked. 67108864 vectors in 1.970 s = 34056.804 kvecs/s, Found 520 feasible solutions.
- **bip_cXJoL0.dat**: 25 rows, 17 cols, Checked. 131072 vectors in 0.002 s = 53173.225 kvecs/s, Found 520 feasible solutions.
- **bip_de6 XFz.dat**: 15 rows, 24 cols, Checked. 16777216 vectors in 0.400 s = 41993.853 kvecs/s, Found 2419020 feasible solutions.
- **bip_f4vmB0.dat**: 44 rows, 21 cols, Checked. 2097152 vectors in 0.064 s = 32894.438 kvecs/s, Found 668 feasible solutions.
- **bip_gHIlD5.dat**: 20 rows, 17 cols, Checked. 131072 vectors in 0.002 s = 64314.033 kvecs/s, Found 668 feasible solutions.
- **bip_iNRRAG.dat**: 11 rows, 24 cols, Checked. 16777216 vectors in 0.354 s = 47390.588 kvecs/s, Found 4309375 feasible solutions.
- **bip_jCG8RM.dat**: 11 rows, 21 cols, Checked. 2097152 vectors in 0.046 s = 45457.840 kvecs/s, Found 12 feasible solutions.
- **bip_jMcBE2.dat**: 68 rows, 27 cols, Checked. 134217728 vectors in 4.972 s = 26994.200 kvecs/s, Found 12 feasible solutions.
- **bip_l9Uziw.dat**: 15 rows, 23 cols, Checked. 8388608 vectors in 0.199 s = 42098.806 kvecs/s, Found 0 feasible solutions.
- **bip_qbEwMP.dat**: 8 rows, 7 cols, Checked. 128 vectors in 0.000 s = 42666.667 kvecs/s, Found 12 feasible solutions.
- **bip_sTsPro.dat**: 37 rows, 17 cols, Checked. 131072 vectors in 0.003 s = 47148.201 kvecs/s, Found 0 feasible solutions.
- **bip_vFWywT.dat**: 8 rows, 20 cols, Checked. 1048576 vectors in 0.202 s = 51794.320 kvecs/s, Found 364952 feasible solutions.
- **bip_WDeMV.dat**: 15 rows, 24 cols, Checked. 16777216 vectors in 0.395 s = 42483.967 kvecs/s, Found 2419020 feasible solutions.
Comparison

`bip_2NrNnC.dat` 28 rows, 26 cols, 191100 solus

gcc -O3 -march=native

ex6 1.346 s = 49875.561 kvecs/s
ex5 123.934 s = 541.487 kvecs/s
ex5 23.024 s = 2914.777 kvecs/s -DNDEBUG
Exercise

• Find out how $n \& \neg n$ works
• Find out how
  
  ```
  if (updatemask & 0xffff0000)
    colidx += 16;
  if (updatemask & 0xff00ff00)
    colidx += 8;
  if (updatemask & 0xf0f0f0f0)
    colidx += 4;
  if (updatemask & 0xcccccccc)
    colidx += 2;
  if (updatemask & 0xaaaaaaaa)
    colidx += 1;
  ```

  works
• Read about De Bruijin sequences and Gray codes
• Find out how to enumerate subset sum and knapsack problems.
• Finish the code.