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% Run the GraphBLAS demo2
gbdemo2
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 GBDEMO2 Extreme performance differences: GraphBLAS vs MATLAB.

  Usage:

        gbdemo2             % uses a default bnz = 6000
        gbdemo2 (20000)     % uses bnz = 20000

  The GraphBLAS operations used in gbdemo are perhaps 3x to 50x
  faster than the corresponding MATLAB operations, depending on how
  many cores your computer has.  Here's an example where GraphBLAS is
  asymptotically far faster than MATLAB R2019a: a simple assignment
  for a large matrix C:

        C(I,J) = A

  The matrix C is constructed via C = kron (B,B) where nnz (B) is
  roughly the bnz provided on input (with a default of bnz = 6000),
  so that C will have about bnz^2 entries, or 36 million by default.
  I and J are chosen randomly, and A is 5000-by-5000.

  When the problem becomes large, MATLAB will take a very long time.
  If you have enough memory, and want to see higher speedups in
  GraphBLAS, increase bnz (and be prepared to wait even longer).
  With the default bnz = 6000, this test takes about 4GB of RAM.

  On my Dell XPS 4-core laptop (Intel(R) Core(TM) i7-8565U, 16GB
  RAM), using MATLAB R2019a, when C becomes 9 million by 9 million,
  the computation C(I,J)=A for MATLAB matrices C, I, J, and A takes
  several minutes, whereas GraphBLAS takes less than a second, or
  about 500x faster than MATLAB.  On a desktop with an Intel(R)
  Xeon(R) CPU E5-2698 v4 @ 2.20GHz with 20 hardware cores, the
  speedup over MATLAB is even more dramatic (up to 2,660x has been
  observed).

  See also gb.assign, subsasgn.


# of threads used in GraphBLAS: 20


C(I,J)=A where C is 1 million -by- 1 million
with 35.7126 million entries:

    A is 5000-by-5000 with 49960 entries
    setup time:     0.358629 sec
    GraphBLAS time: 0.206304 sec
    Starting MATLAB ... please wait ...
    MATLAB time:    0.461267 sec
    Speedup of GraphBLAS over MATLAB: 2.23586
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    check time:     0.250513 sec
    all tests passed

C(I,J)=A where C is 4 million -by- 4 million
with 35.8202 million entries:

    A is 5000-by-5000 with 49960 entries
    setup time:     0.449247 sec
    GraphBLAS time: 0.23112 sec
    Starting MATLAB ... please wait ...
    MATLAB time:    0.476041 sec
    Speedup of GraphBLAS over MATLAB: 2.05971
    check time:     0.246997 sec
    all tests passed

C(I,J)=A where C is 9 million -by- 9 million
with 35.928 million entries:

    A is 5000-by-5000 with 49960 entries
    setup time:     0.515 sec
    GraphBLAS time: 0.260287 sec
    Starting MATLAB ... please wait ...
    MATLAB time:    238.297 sec
    Speedup of GraphBLAS over MATLAB: 915.518
    check time:     0.263272 sec
    all tests passed

C(I,J)=A where C is 16 million -by- 16 million
with 35.916 million entries:

    A is 5000-by-5000 with 49960 entries
    setup time:     0.577607 sec
    GraphBLAS time: 0.306538 sec
    Starting MATLAB ... please wait ...
    MATLAB time:    256.948 sec
    Speedup of GraphBLAS over MATLAB: 838.226
    check time:     0.287599 sec
    all tests passed

C(I,J)=A where C is 25 million -by- 25 million
with 35.964 million entries:

    A is 5000-by-5000 with 49960 entries
    setup time:     0.647285 sec
    GraphBLAS time: 0.269498 sec
    Starting MATLAB ... please wait ...
    MATLAB time:    279.949 sec
    Speedup of GraphBLAS over MATLAB: 1038.78
    check time:     0.325112 sec
    all tests passed

C(I,J)=A where C is 36 million -by- 36 million
with 35.976 million entries:
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A is 5000-by-5000 with 49960 entries
setup time:     0.727768 sec
GraphBLAS time: 0.424682 sec
Starting MATLAB ... please wait ...
MATLAB time:    307.942 sec
Speedup of GraphBLAS over MATLAB: 725.111
check time:     0.366849 sec
all tests passed
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