

hepsort.cpp - Code::Blocks 20.03

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Start here x hepsort.cpp x

```
1 //Navan,Chandra (CSE-21,ID-214001)
2 #include <bits/stdc++.h>
3 using namespace std;
4
5 void heapify(vector<int>& vec, int n, int i)
6 {
7
8     int lar = i;
9     int le = 2 * i + 1;
10    int ri = 2 * i + 2;
11    if (le < n && vec[le] > vec[lar])
12    {
13        lar = le;
14    }
15    if (ri < n && vec[ri] > vec[lar])
16    {
17        lar = ri;
18    }
19    if (lar != i)
20    {
21        swap(vec[i], vec[lar]);
22        heapify(vec, n, lar);
23    }
24 }
25
26 void heapSort(vector<int>& vec)
27 {
28     int n = vec.size();
29     for (int i = n / 2 - 1; i >= 0; i--)
30     {
31         heapify(vec, n, i);
32     }
33     for (int i = n - 1; i > 0; i--)
34     {
35         swap(vec[0], vec[i]);
36     }
37 }
```

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hepsort.cpp - Code::Blocks 20.03

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Start here x hepsort.cpp x

```
33 {
34     swap(vec[0], vec[i]);
35     heapify(vec, i, 0);
36 }
37
38
39 int main()
40 {
41     int n = 100;
42     vector<int> vec(n);
43
44     random_device rd;
45     mt19937 gen(rd());
46     uniform_int_distribution<> dis(1, n);
47     for (int i = 0; i < n; i++)
48         vec[i] = dis(gen);
49
50     ofstream ranFileIn("ran.txt");
51     for (int it : vec) {
52         ranFileIn << it << " ";
53     }
54     ranFileIn.close();
55
56     ifstream ranFileOut("ran.txt");
57     for (int& it : vec) {
58         ranFileOut >> it;
59     }
60     ranFileOut.close();
61
62     heapSort(vec);
63
64     return 0;
65 }
66
```

Select "D:\CSE-31\algorithm design and analysis\lab-2\hepsort.exe"

Process returned 0 (0x0) execution time : 0.047 s
Press any key to continue.

ran.txt - Notepad

File Edit Format View Help

57 73 35 92 1 60 88 52 96 98 17 67 32 53 71 79 26 8 58 33 34 59 24 4 18
93 97 2 66 78 48 34 7 35 2 42 85 91 29 66 93 58 85 1 57 29 89 73 1 71
27 46 34 23 94 88 48 72 98 89 77 34 71 68 17 61 50 7 65 77 67 83 86 15
54 1 31 50 33 10 42 70 57 63 70 76 58 47 32 78 100 76 59 98 40 18 41 45
15 84 |

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hepsort.cpp - Code::Blocks 20.03

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Start here x hepsort.cpp x

```
33 {
34     swap(vec[0], vec[i]);
35     heapify(vec, i, 0);
36 }
37
38
39 int main()
40 {
41     int n = 1000;
42     vector<int> vec(n);
43
44     random_device rd;
45     mt19937 gen(rd());
46     uniform_int_distribution<> dis(1, n);
47     for (int i = 0; i < n; i++)
48         vec[i] = dis(gen);
49
50     ofstream ranFileIn("ran.txt");
51     for (int it : vec) {
52         ranFileIn << it << " ";
53     }
54     ranFileIn.close();
55
56     ifstream ranFileOut("ran.txt");
57     for (int& it : vec) {
58         ranFileOut >> it;
59     }
60     ranFileOut.close();
61
62     heapSort(vec);
63
64     return 0;
65 }
66
```

Select "D:\CSE-31\algorithm design and analysis\lab-2\hepsort.exe"

Process returned 0 (0x0) execution time : 0.062 s
Press any key to continue.

ran.txt - Notepad

File Edit Format View Help

562 727 349 916 7 595 873 516 960 976 170 662 317 529 702 789 256 75
575 330 339 584 239 31 173 929 967 20 654 780 478 337 67 343 14 415 842
908 283 652 921 571 849 8 561 287 890 730 2 703 263 453 338 224 935 873
479 718 979 886 768 337 703 672 167 606 498 67 647 769 665 827 852 145
534 3 307 494 329 98 414 693 563 626 697 755 577 462 320 778 995 752
583 977 398 178 410 450 143 836 634 577 356 400 154 792 98 493 153 543
838 740 620 126 840 129 116 766 803 443 258 209 67 888 348 340 495 839
844 925 381 799 451 317 278 500 198 136 330 455 709 547 203 882 464 726
339 347 985 955 771 598 131 181 56 350 504 761 554 514 431 853 424 360
75 765 135 204 957 461 171 220 419 396 454 141 24 735 559 586 706 842
481 768 444 990 671 914 20 924 420 876 205 791 955 890 899 354 989 368
198 74 219 819 26 679 456 675 227 679 807 307 636 538 914 301 812 795
97 832 56 546 373 86 620 209 195 157 418 301 459 296 886 253 445 341
280 364 167 573 613 842 625 773 497 225 983 341 63 982 408 311 547 354
376 225 308 703 412 867 422 453 639 467 188 572 735 369 89 4 563 102
707 222 739 864 833 980 162 550 884 346 961 973 745 679 510 191 555 246
862 396 54 725 398 736 510 657 49 763 76 340 413 998 120 882 614 543
883 44 777 652 30 318 742 767 309 149 186 144 123 990 335 362 169 486
254 960 384 36 439 125 326 496 826 332 765 828 479 707 644 475 650 351
737 693 822 536 6 167 301 458 196 775 944 334 238 658 696 916 648 202
993 461 594 414 779 137 432 983 355 53 12 612 721 636 555 263 938 568
452 324 347 532 982 278 307 381 600 884 189 164 810 318 152 101 843 779
401 358 940 285 859 465 327 304 769 70 463 305 747 312 17 470 212 424
335 531 992 712 125 885 73 538 343 281 532 811 8 804 295 992 365 301
180 688 107 909 641 592 973 637 703 57 848 961 24 26 839 17 510 542 209
754 816 42 520 944 750 902 554 264 899 427 97 942 193 340 816 934 658
948 582 366 712 682 873 456 575 334 169 83 431 138 345 907 574 504 922

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hepsort.cpp - Code::Blocks 20.03

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Start here x hepsort.cpp x

```
33 {
34     swap(vec[0], vec[i]);
35     heapify(vec, i, 0);
36 }
37
38
39 int main()
40 {
41     int n = 10000;
42     vector<int> vec(n);
43
44     random_device rd;
45     mt19937 gen(rd());
46     uniform_int_distribution<> dis(1, n);
47     for (int i = 0; i < n; i++)
48         vec[i] = dis(gen);
49
50     ofstream ranFileIn("ran.txt");
51     for (int it : vec) {
52         ranFileIn << it << " ";
53     }
54     ranFileIn.close();
55
56     ifstream ranFileOut("ran.txt");
57     for (int& it : vec) {
58         ranFileOut >> it;
59     }
60     ranFileOut.close();
61
62     heapSort(vec);
63
64     return 0;
65 }
66
```

Select "D:\CSE-31\algorithm design and analysis\lab-2\hepsort.exe"

Process returned 0 (0x0) execution time : 0.062 s
Press any key to continue.

ran.txt - Notepad

File Edit Format View Help

9300 785 7339 565 3047 737 806 262 3114 8361 2215 1703 5760 9098
1288 5124 1990 3524 4296 5494 54 4545 3877 3873 7621 58 2506 799
8824 9142 2432 6788 9275 2968 1823 67 9672 1527 1367 2829 7301 9
8863 9593 1311 8221 1492 9826 5279 1757 6143 4002 6172 4166 8293
6572 88 4933 7118 3959 1883 295 6067 9465 4008 8721 31 1770 8608
9473 1477 9200 6496 2314 7502 6176 8975 6289 3014 8149 1757 2115
971 4957 1845 165 8658 8653 5670 3964 2585 4756 6797 7517 8701 2
3213 8178 435 844 3204 9874 998 9814 3418 4814 1177 8718 5557 57
4561 4216 8459 5051 2851 2706 5021 2661 6191 394 9552 9536 1348
3735 6020 8399 2899 5231 8488 9977 6275 7431 5524 7762 221 7596
5635 9061 3069 2612 6938 3822 2353 3783 5929 221 5284 1706 3869
4752 4193 9002 8425 3864 2652 8067 7737 7556 8274 4174 5124 3577
7047 9789 8875 3810 6950 1998 7306 6291 2484 8964 1973 5608 6005
2870 5419 2779 6493 7486 5840 1092 1533 8261 855 4290 2716 1407
8370 6613 7299 6391 2431 2719 1562 6285 2216 930 7494 314 2598 4
3422 7883 2007 7131 2134 1276 5718 3863 5028 178 1517 4989 2484
9900 3666 97 62 2561 5845 9192 9344 8587 8435 9975 8650 7323 334
9284 9872 9866 5080 3338 4836 9007 4203 957 1526 4775 9374 5894
6094 6030 1255 649 4599 2845 6787 3301 3028 4247 4133 7245 2247
9915 6735 2293 801 9741 7095 6105 8540 7088 421 1 5466 8259 4956
6980 8366 1939 2215 6335 6570 9664 5192 935 5641 7032 7413 3313
3724 8810 6439 7750 1816 4164 4845 8209 6131 7590 7003 2099 6308
7739 2675 3781 3727 1113 2156 8179 6127 2679 4697 6772 8705 3132
952 1957 1860 6421 6406 6033 3313 8315 8185 3442 9869 9133 4415
2399 8906 8732 8224 3404 2904 7034 4152 8571 9838 2585 796 151 8
5764 6343 2270 5363 1346 3258 6660 1853 8985 7946 7952 5103 8103

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hepsort.cpp - Code::Blocks 20.03

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Start here x hepsort.cpp x

```
33 {
34     swap(vec[0], vec[i]);
35     heapify(vec, i, 0);
36 }
37
38
39 int main()
40 {
41     int n = 100000;
42     vector<int> vec(n);
43
44     random_device rd;
45     mt19937 gen(rd());
46     uniform_int_distribution<> dis(1, n);
47     for (int i = 0; i < n; i++)
48         vec[i] = dis(gen);
49
50     ofstream ranFileIn("ran.txt");
51     for (int it : vec) {
52         ranFileIn << it << " ";
53     }
54     ranFileIn.close();
55
56     ifstream ranFileOut("ran.txt");
57     for (int& it : vec) {
58         ranFileOut >> it;
59     }
60     ranFileOut.close();
61
62     heapSort(vec);
63
64     return 0;
65 }
66
```

Select "D:\CSE-31\algorithm design and analysis\lab-2\hepsort.exe"

Process returned 0 (0x0) execution time : 0.172 s
Press any key to continue.

ran.txt - Notepad

File Edit Format View Help

96721 15264 13671 28284 73005 93781 88624 95924 13104 82203 14911 98
52782 17569 61424 40014 61714 41657 82924 64835 65720 872 49329 7118
39590 18827 2944 60669 94644 40075 87204 307 17693 86072 47936 94725
14764 91995 64955 23131 75016 61759 89745 62882 30135 81488 17569 21
55663 9707 49567 18450 1644 86577 86531 56697 39631 25849 47555 6797
75171 87007 24504 32128 81776 4347 8435 32036 98736 9977 98140 34175
48133 11761 87180 55571 57240 61073 45602 42158 84590 50510 28509 27
50211 26601 61907 3937 95512 95358 13472 79823 37342 60201 83982 285
52309 84874 99762 62747 74307 55233 77616 2204 75953 41052 56349 906
30689 26120 69375 38213 23521 37830 59282 2208 52840 17058 38689 127
47514 41928 90019 84248 38633 26515 80664 77370 75552 82739 41732 51
35763 50556 70463 97888 88742 38096 69494 19971 73059 62910 24832 85
19726 56079 60043 44163 28697 54189 27789 64926 74861 58395 10918 15
82611 8548 42895 27158 14061 40542 83696 66126 72982 63901 24304 271
15616 62843 22160 9296 74940 3137 25973 47601 34218 78830 20066 7136
21331 12760 57175 38623 50273 1780 15170 49882 24831 74033 98994 366
969 614 25603 58450 91918 93441 85870 84347 99748 86492 73229 3337
12983 92838 98713 98654 50799 33374 48356 90066 42029 9561 15253 477
93738 58939 26828 60932 60301 12542 6488 45990 28449 67863 33006 302
42464 41329 72446 22463 67750 99146 67343 22925 8010 97412 70949 616
85402 70878 4207 5 54657 82587 49552 68644 69797 83660 19387 22144
63350 65700 96641 51916 9348 56404 70316 74127 33130 36203 37237 881
64389 77493 18154 41634 48447 82087 61308 75894 70028 20987 63075 37
77391 26750 37806 37263 11124 21559 81782 61268 26784 46966 67720 87
31320 28011 9514 19562 18593 64206 64054 60327 33129 83142 81850 344

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hepsort.cpp - Code::Blocks 20.03

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Start here x hepsort.cpp x

```
33 {
34     swap(vec[0], vec[i]);
35     heapify(vec, i, 0);
36 }
37
38
39 int main()
40 {
41     int n = 1000000;
42     vector<int> vec(n);
43
44     random_device rd;
45     mt19937 gen(rd());
46     uniform_int_distribution<> dis(1, n);
47     for (int i = 0; i < n; i++)
48         vec[i] = dis(gen);
49
50     ofstream ranFileIn("ran.txt");
51     for (int it : vec) {
52         ranFileIn << it << " ";
53     }
54     ranFileIn.close();
55
56     ifstream ranFileOut("ran.txt");
57     for (int& it : vec) {
58         ranFileOut >> it;
59     }
60     ranFileOut.close();
61
62     heapSort(vec);
63
64     return 0;
65 }
66
```

Select "D:\CSE-31\algorithm design and analysis\lab-2\hepsort.exe"

Process returned 0 (0x0) execution time : 1.125 s
Press any key to continue.

ran.txt - Notepad

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75944 339729 412627 997511 119584 881394 613834 543024 882335 43454
776339 651726 29131 317736 741570 766593 308747 148488 185938 143196
122076 989605 334480 361116 168923 485741 253309 959575 383096 35646
438131 124237 325653 495545 825773 331940 765020 828121 478264 70670
643199 474227 650048 350661 736903 692611 822125 536011 5496 166860
300749 457271 195643 774854 943345 333665 237384 657665 695691 91573
647971 201088 993010 461006 593316 414033 778763 136780 432062 98224
355022 52655 11219 611328 720523 635178 554345 262755 937370 567739
452006 323752 346259 531165 982069 277789 306881 380590 599565 88386
188402 163090 809621 317316 151084 100777 842263 779014 400197 35751
940154 284346 858927 464427 326205 303725 768704 69034 462117 305048
746585 312031 16612 469141 211057 423593 335071 530917 991851 711236
124292 884526 72703 538052 342800 280742 531594 810908 7561 803467
294285 991734 364148 300336 179773 687702 106834 908461 640364 59208
973163 636315 702252 56869 847375 960994 23358 25505 838676 16688
509192 541850 208894 754036 815713 41579 519888 944164 749749 901889
554053 263421 898654 426233 96388 941430 192785 339847 815495 933766
657580 948060 581401 365620 711352 681316 872976 455768 574389 33313
168365 82842 430920 137583 344154 906861 573590 503992 921222 667715
594378 317581 901501 494405 786789 673485 622131 244362 115447 76528
184268 142765 298619 18670 818796 606232 14474 853288 484767 115550
140157 207481 878780 153635 437032 702160 70152 641220 388969 587820
39026 265137 324784 291189 616882 11478 280052 592581 560500 761424
985074 658533 504090 240224 267454 616784 665240 542049 461710 58274
551084 274047 214130 465158 413884 477693 702005 878061 599261 72906

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