

비주얼 프로그래밍

과제 5

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각 학번 5000개씩 중복 없이 랜덤으로 생성

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[~/2022_1/Data_structure/Practice_code/Assignment/assignment_5]$ ./a.out *[master]
20208142 20192125 20190472 20197011 20209688 20222855 20229008 20193004 20196849 20229465 20204895 20208209 20227263 20212212 20225077 20217351 20197716 20212571 20223514 20195573 2020835
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각 학번 5000개씩 중복없이 랜덤 생성

```
26
27 void random_id(char id[ARR_SIZE][12], int size)
28 {
29     int i, j, tmp;
30     int count[4] = {0, 0, 0, 0};
31     int arr[ARR_SIZE];
32     srand(time(NULL));
33     for (i = 0; i < size; i++)
34     {
35         tmp = rand()%4;
36         if (count[tmp] < ARR_SIZE/4)
37         {
38             arr[i] = rand()% 10000 + (tmp + 1)*10000 + 20180000;
39             count[tmp]++;
40         }
41         else if (i == size)
42             break;
43         else
44         {
45             i--;
46             continue;
47         }
48         for (j = 0; j < i; j++)
49             if (arr[i] == arr[j])
50             {
51                 count[tmp]--;
52                 i--;
53             }
54     }
55     for (i = 0; i < size; i++)
56     {
57         sprintf(id[i], "%d", arr[i]);
58     }
59
60 }
```

- 각 학번마다 5000명씩 생성되도록 하였고 중복하는 학번이 없도록 생성하였다.
- 랜덤 함수를 이용하여 먼저 0에서 3까지 결정한다 (tmp)
- Tmp 는 19, 20, 21, 22학번 중 하나를 선택할 것이다. 이걸 계산 후 배열에 넣어주고 해당하는 학번의 count를 옮겨준다.
- 만약 해당 학번의 count 가 5000이상일 경우 다시 뽑고
- 그 외에는 밑의 for문으로 가서 그 전에 동일한 학번이 나왔는지 검사한다. 그 경우 해당 학번의 count를 낮추고 i를 줄여 다시 뽑도록 한다.

이름 2만개 랜덤 생성

ksoggnbnsq vaiqgtqdnv lndbgqkysv yjmppamio goacvtutko vkomxkjutw ugxlptarl ctiwaxkard pxyfqcnasw eihniptrvd qirzniblkt rmpecmtphi zpewbnyhcw sqaffnkpmv vryvgvtdxd rophaygkpr uwkwjmgfrf
ebbnvevamc jowgyxvklo nqyftazhhw fhsnkshjnu pspdgjgqfg ukukayoacr enhvczoccz xyrckzefl lyynjtnwwg nawdpztrjz zrycuhduej gblbqarjjx hrjznpevha nxnwegadat sckcwodnby aefjjqrhwz wuemwptve
yctawtzcwg edsoxmdskm sknwirxbzq jlnvwyykap gkmqntioogu iptkfyjwas wchyxqnbv cuptwxnoew upmfualzfm mdkrhzuemo ikxljfxgky tzitmtjwcu vlnzevsvim pblpafibri ctbpsmhweh wrvoqicco rukvjamtmb
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wmkapymund xigrmfeora sdsrutrksz mwozedvjr xbrmladzilqu igsgunmrwo hmwwtvzfyu dpsgbjyafh inqsmjnph lliliouonzv sxsnntjnjh kukxyhtwhf phavqimrg ryosvojcom bijbidxmvg fmigqnmemn ysgjzhdnqr
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번호 2만개 랜덤 생성

01077094032 01090095570 01030751096 01073296162 01082615695 01035962713 01068835391 01036998195 01058010890 01089095079 01072797598 01015252356 01090808236 01066694283 01087608149 01082381189 01077931305 01005612438 01092827179 01036653036 01015667502 01038627776 01079101584 01017060680 01005549304 01018988282 01011830709 01032208718 01098603417 01045620095 01068731176 01055964885 01031090246 01009726448 01014352228 01064387504 01066834885 01016850802 01080097872 01039166900 01023502839 01053441724 01098059741 01039979856 01079318815 01047962274 01049253505 01043692915 01061743126 01009098764 01020749596 01084372591 01041710395 01047666695 01083394136 01014281229 01072308203 01077661622 01006169845 01054394073 01080639769 01001206196 01020563510 01059075626 01019686753 01006611500 01043008297 01092790849 01050075426 01034253147 01022552619 01086789803 01062513512 01016135783 01052890984 01027456977 01056590736 01014980405 01013676921 01064595871 01024681869 01011759062 01060819149 01021262058 01039403953 01060894240 01065227791 01092510375 01034705086 01032465375 01067339991 01004978983 01031276244 01018259455 01037539862 01014490548 01062823787 01076882367 01056652073 01057607909 01052445521 01075918986 01063428390 01059167116 01094974902 01052064746 01019514888 01080169257 01058049527 01095398219 01005680456 01081206276 01078369082 01037454361 01051773176 01095902501 01050111496 01041397732 01021067867 01086498773 01033968479 01059625883 01052477797 01076061655 01099054428 01059545261 01047354494 01026885789 01065241879 01002736065 01023556152 01035120221 01042930174 01019732441 01020606567 01070785508 01017839458 01079810182 01035065574 01024166243 01016931032 01003832536 01094752606 01055670170 01063467796 01066155195 01097237743 01068521393 01056774345 01027694659 01027788212 01049832718 01051141097 01049442076 01077313139 01019752113 01005513470 01058646666 01016382039 01055318707 01073023747 01060381748 01049480091 01013404742 01063043845 01038297897 01022239074 01081479045 01005511041 01078359127 01093419063 01071845430 01063345134 01005257875 01064134788 01057634448 01047687210 01021011317 01057093742 01088805327 01038803818 01094897296 01075098538 01034804555 01069337052 01097623684 01036034479 01022581488 01060442264 01008412742 01002811066 01096229985 01088257292 01047621842 01007744748 01055788750 01098960685 01060326877 01056962707 01046516504 01054379695 01001309342 01021084862 01040650009 01069324619 01034102817 01025212625 01043088401 01046610298 01033159075 01046758864 01015002147 01095814037 01010329148 01053703496 01098256554 01015027762 01065815983 01006904238 01055777303 01012320729 01015348162 01082561621 01091964217 01084183933 01050912867 01096862759 01027015281 01089075125 01017801746 01013336940 01069237564 01083968989 01077279177 01011581089 01021978750 01010769666 01046353318 01062495548 01042506805 01044561784 01051544691 01006552862 01098508743 01054754869 01088189296 01069799471 01058534890 01036036116 01058759162 01087593729 01056860752 01028154470 01038384427 01016625830 01065826561 01051514252 01097650561 01036240511 01027580035 01013948665 01036324860 01017024909 01013982559 01022837602 01017502049 01026497928 01039679399 01054429659 01083006012 01056421510 01012132994 01035336702 01026685282 01080319188 01089893030 01076931547 01004263455 01097231119 01020288939 01013258504 01015133633 01009941256 01004449093 01032803177 01081949503 01020746571 01009167385 01047674362 01072452884 01048694024 01001410540 01091256336 01049009987 01074812619 01079560881 01086959360 01012322722 01038573081 01049222719 01023666218 01095887105 01092070627 01087212434 01083885867 01082933671 01039725686 01065247924 01014077462 01099733089 01096250537 01017772224 01011998140 01063020675 01068618760 01014179893 01009954652 01006490994 01069100804 01043343679 01068085222 01032882673 01034485224 01046284691 01073343385 01053691059 01040188671 0101663616 01094382127 01038834859 01018240906 01046822378 01039441682 01024571633 01066883945 01024476642 01038753296 01032516075 01067139698 01003073868 01052662107 01011183107 01010878934 01005491688 01078228334 01052904630 01081372173 01079176777 01014308942 01029667234 01064799934 01056480197 01018497511 01096741072 01006573337 01066126113 01051633548 01025715482 010949102 01055248218 01031631905 01041966873 01084453513 01050584064 01075438343 01028846657 01097169399 01018611264 01098481738 01044096944 01023536230 01039105875 01032645330 01025869463 01057794084 01003683624 01009135505 01083247280 01024340344 01076833058 01040502801 01038199205 01085740636 01080487558 01071103794 01066915534 01068066099 01055655092 01045670234 0100856170 01031379990 01092891981 01049080516 01014739725 01091881471 01080274905 01035225103 01099021306 01094693992 01059779342 01012937814 01006410940 01087595972 01064641842 01011157954 01088380841 01065620001 01014603397 01072172145 01018997597 01083692367 01005173542 01061615573 01012624717 01094766751 01009967754 01099702167 01049533654 01091992647 01089022785 01049599336 01007930338 01045982822 01026073234 01055278066 01031634609 01089674101 01099844861 01055414371 01002048485 01071097859 01096462274 01058975511 01033771339 01037784952 01090682863 01057502207 01081774130 01038708206 01079485375 01058854972 01062916422 01076891820 01011220114 01092073222 01012797436 01065280026 01077711666 01019003433 01059717013 01068396799 01061777108 01028170160 01056535067 01036200285 01008529520 01067178841 01012399366 01058834369 01058871361 01025983860 01024542260 01016609867 01055570692 01005769373 01080355781 01054685902 01038854411 01069272981 01087268255 01056393945 01099878016 01034086760 01035730167 01070989472 01023799082 01040604357 01004539054 01035399573 01032926446 01008421638 01095304512 01095413289 01000047024 01005720724 01051472468 01080502571 01078695406 01006546906 01084300935 01061827364 01015317846 01091118680 01002152410 01047234272 01072548197 01012732784 01061377132 01048143932 01098402727 01004940418 01066130961 01019164739 01069495544 01077117954 01076274426 01099174306 01089795627 01081155649 01099755502 01002911516 01097111028 01073980472 01020742003 01022395482 01006236009 01060006634 01063477119 01096063449 01091095236 01032859009 01068832832 01070515217 01003650720 01055678642 01005478617 01035121493 01019761503 01018246534 010468766

번호와 이름 랜덤 생성

```
62 void random_name(char arr[ARR_SIZE][12], int size)
63 {
64     int i,j,index;
65     char alpha[30] = "abcdefghijklmnopqrstuvwxyz";
66     srand(time(NULL));
67     for (i = 0; i < size; i++)
68     {
69         for (j = 0; j < 10; j++)
70         {
71             index = rand()%26;
72             arr[i][j] = alpha[index];
73         }
74         arr[i][j] = '\0';
75     }
76 }
77
78 void random_number(char arr[ARR_SIZE][12] , int size)
79 {
80     int i,j;
81     char num[11] = "0123456789";
82     srand(time(NULL));
83     for (i = 0; i < size; i++)
84     {
85         arr[i][0] = '0';
86         arr[i][1] = '1';
87         arr[i][2] = '0';
88         for (j = 3; j < 11; j++)
89             arr[i][j] = num[rand()%10];
90         arr[i][j] = '\0';
91     }
92 }
93 }
```

- 번호와 이름의 경우 중복해도 되므로 중복검사는 따로 하지 않았다.
- 번호와 이름의 경우 한글자씩 랜덤으로 뽑아 한 단어의 길이만큼 저장하고 다음 단어를 뽑는 식으로 생성했다.
- 후에 정렬을 용이하게 하기 위해 학번 이름 번호 모두 문자열 이중배열로 생성했다.

C언어 내장함수 qsort 사용 - 학번 정렬

```
Use qsort to id array
20190000 20190001 20190002 20190006 20190011 20190012 20190015 20190016 20190017 20190021 20190022 20190024 20190029 20190030 20190032 20190034 20190035 20190038 20190039 20190040 2019004
3 20190044 20190046 20190050 20190054 20190055 20190057 20190058 20190059 20190061 20190062 20190063 20190064 20190065 20190068 20190069 20190071 20190072 20190075 20190076 20190077 20190
079 20190083 20190085 20190086 20190089 20190091 20190095 20190096 20190097 20190098 20190099 20190100 20190103 20190104 20190107 20190108 20190109 20190110 20190112 20190114 20190115 201
90117 20190121 20190122 20190126 20190127 20190129 20190130 20190132 20190134 20190135 20190138 20190139 20190142 20190143 20190144 20190146 20190148 20190153 20190155 20190156 20190159 2
0190160 20190165 20190169 20190170 20190173 20190176 20190177 20190179 20190180 20190181 20190182 20190184 20190186 20190187 20190190 20190191 20190192 20190193 20190197 20190198 20190199
20190203 20190204 20190209 20190213 20190214 20190216 20190219 20190221 20190222 20190223 20190224 20190227 20190228 20190229 20190235 20190236 20190238 20190239 20190241 20190242 20190
49 20190251 20190252 20190255 20190256 20190257 20190258 20190261 20190262 20190264 20190267 20190269 20190272 20190274 20190276 20190278 20190281 20190282 20190283 20190284 20190288 2019
0290 20190291 20190292 20190293 20190294 20190295 20190297 20190300 20190302 20190303 20190304 20190305 20190307 20190310 20190311 20190312 20190314 20190316 20190319 20190326 20190327 20
190328 20190332 20190333 20190334 20190336 20190339 20190340 20190342 20190346 20190347 20190349 20190350 20190352 20190353 20190354 20190357 20190358 20190359 20190362 20190364 20190365
20190367 20190368 20190373 20190374 20190378 20190379 20190381 20190383 20190384 20190385 20190386 20190387 20190389 20190390 20190391 20190392 20190395 20190403 20190404 20190406 201904
7 20190410 20190412 20190414 20190415 20190416 20190418 20190419 20190420 20190424 20190425 20190429 20190432 20190433 20190435 20190438 20190440 20190441 20190444 20190446 20190448 20190
449 20190450 20190455 20190456 20190459 20190461 20190463 20190465 20190466 20190468 20190470 20190472 20190473 20190474 20190476 20190479 20190480 20190483 20190484 20190486 20190488 201
90489 20190490 20190491 20190495 20190496 20190498 20190499 20190500 20190501 20190502 20190503 20190507 20190509 20190510 20190514 20190516 20190517 20190519 20190521 20190522 20190525 2
0190526 20190531 20190532 20190534 20190536 20190537 20190538 20190541 20190543 20190544 20190548 20190549 20190553 20190555 20190556 20190557 20190558 20190560 20190562 20190565 20190567
20190571 20190574 20190575 20190578 20190580 20190582 20190586 20190587 20190588 20190592 20190593 20190597 20190598 20190599 20190600 20190603 20190604 20190605 20190610 201906
11 20190612 20190615 20190617 20190618 20190619 20190624 20190626 20190628 20190630 20190631 20190633 20190634 20190638 20190641 20190643 20190650 20190651 20190652 20190657 20190658 2019
0660 20190663 20190664 20190665 20190668 20190670 20190674 20190677 20190679 20190680 20190682 20190685 20190687 20190688 20190690 20190693 20190700 20190702 20190704 20190710 20190712 20
190717 20190719 20190720 20190721 20190722 20190725 20190726 20190727 20190729 20190730 20190731 20190734 20190736 20190737 20190738 20190740 20190741 20190744 20190747 20190751 20190753
20190757 20190761 20190763 20190764 20190765 20190770 20190772 20190773 20190776 20190779 20190780 20190781 20190782 20190783 20190784 20190785 20190786 20190787 20190790 20190791 2019079
5 20190796 20190797 20190799 20190800 20190801 20190805 20190807 20190808 20190811 20190812 20190813 20190818 20190823 20190830 20190831 20190832 20190833 20190834 20190840 20190842 20190
844 20190845 20190846 20190849 20190851 20190856 20190857 20190858 20190861 20190863 20190864 20190867 20190869 20190870 20190872 20190876 20190878 20190879 20190883 20190884 20190888 201
90889 20190892 20190894 20190895 20190896 20190897 20190898 20190899 20190900 20190901 20190902 20190903 20190904 20190906 20190907 20190908 20190911 20190912 20190913 20190914 20190915 2
0190919 20190920 20190921 20190923 20190924 20190925 20190926 20190930 20190935 20190938 20190939 20190940 20190941 20190942 20190943 20190945 20190946 20190947 20190949 20190951 20190953
20190955 20190956 20190957 20190961 20190964 20190965 20190966 20190969 20190971 20190972 20190974 20190985 20190986 20190987 20190992 20190993 20190995 20190997 20191006 20191007 201910
11 20191012 20191017 20191018 20191023 20191024 20191025 20191027 20191028 20191029 20191030 20191031 20191032 20191033 20191035 20191041 20191043 20191044 20191045 20191049 20191050 2019
1052 20191054 20191057 20191058 20191060 20191061 20191063 20191065 20191067 20191068 20191070 20191073 20191076 20191077 20191078 20191080 20191082 20191084 20191085 20191086 20191087 20
191088 20191089 20191091 20191093 20191094 20191095 20191098 20191100 20191103 20191106 20191111 20191112 20191113 20191114 20191116 20191117 20191119 20191120 20191125 20191126 20191128
```

C언어 내장함수 qsort 사용 - 학번 정렬

```
20229118 20229119 20229120 20229121 20229123 20229127 20229129 20229133 20229135 20229139 20229140 20229141 20229142 20229143 20229144 20229145 20229146 20229147 20229148 20229149 20229150 20229151 20229156 20229157 20229159 20229160 20229163 20229165 20229167 20229169 20229170 20229172 20229173 20229174 20229175 20229177 20229178 20229179 20229180 20229182 20229184 20229187 20229188 20229189 20229191 20229192 20229193 20229195 20229196 20229197 20229198 20229199 20229202 20229205 20229210 20229211 20229212 20229213 20229214 20229216 20229221 20229222 20229228 20229229 20229230 20229231 20229235 20229236 20229237 20229238 20229240 20229243 20229247 20229248 20229252 20229253 20229263 20229264 20229265 20229266 20229269 20229270 20229275 20229277 20229279 20229281 20229283 20229288 20229289 20229291 20229292 20229293 20229294 20229297 20229299 20229301 20229302 20229304 20229308 20229314 20229315 20229318 20229319 20229321 20229323 20229324 20229325 20229326 20229329 20229330 20229331 20229332 20229336 20229337 20229340 20229344 20229345 20229350 20229351 20229352 20229356 20229357 20229359 20229360 20229361 20229363 20229364 20229365 20229366 20229369 20229373 20229376 20229379 20229380 20229381 20229383 20229384 20229385 20229386 20229391 20229395 20229397 20229398 20229399 20229400 20229402 20229406 20229408 20229412 20229413 20229417 20229418 20229419 20229420 20229424 20229426 20229427 20229432 20229435 20229437 20229438 20229441 20229448 20229449 20229457 20229460 20229461 20229463 20229465 20229467 20229470 20229471 20229472 20229473 20229475 20229478 20229481 20229483 20229484 20229485 20229487 20229488 20229489 20229490 20229492 20229499 20229500 20229501 20229504 20229506 20229509 20229510 20229512 20229516 20229517 20229519 20229520 20229521 20229522 20229523 20229525 20229527 20229528 20229529 20229530 20229531 20229533 20229537 20229540 20229541 20229544 20229545 20229546 20229547 20229549 20229551 20229552 20229555 20229556 20229557 20229562 20229563 20229565 20229567 20229568 20229570 20229571 20229574 20229575 20229578 20229582 20229583 20229584 20229586 20229587 20229588 20229589 20229591 20229592 20229594 20229595 20229597 20229599 20229603 20229609 20229610 20229613 20229615 20229616 20229617 20229618 20229622 20229623 20229627 20229628 20229629 20229631 20229633 20229634 20229636 20229638 20229641 20229648 20229652 20229654 20229655 20229656 20229657 20229658 20229663 20229664 20229665 20229666 20229670 20229677 20229680 20229684 20229686 20229688 20229693 20229696 20229699 20229701 20229702 20229703 20229707 20229708 20229709 20229711 20229714 20229715 20229716 20229717 20229718 20229720 20229724 20229725 20229727 20229728 20229729 20229732 20229733 20229738 20229740 20229742 20229744 20229745 20229746 20229747 20229748 20229750 20229752 20229757 20229759 20229761 20229763 20229765 20229766 20229770 20229772 20229775 20229776 20229781 20229782 20229785 20229787 20229788 20229791 20229792 20229794 20229797 20229798 20229802 20229803 20229805 20229807 20229808 20229811 20229812 20229816 20229817 20229818 20229819 20229820 20229821 20229824 20229826 20229827 20229829 20229830 20229833 20229835 20229838 20229841 20229842 20229843 20229844 20229845 20229846 20229847 20229849 20229850 20229852 20229854 20229855 20229856 20229857 20229859 20229860 20229863 20229864 20229865 20229866 20229869 20229870 20229872 20229873 20229874 20229877 20229879 20229880 20229883 20229887 20229890 20229893 20229894 20229895 20229896 20229900 20229901 20229902 20229903 20229907 20229908 20229910 20229913 20229914 20229917 20229918 20229919 20229922 20229923 20229925 20229926 20229927 20229930 20229933 20229934 20229935 20229936 20229937 20229938 20229940 20229941 20229943 20229946 20229947 20229948 20229949 20229951 20229952 20229953 20229956 20229959 20229961 20229962 20229964 20229965 20229966 20229967 20229969 20229970 20229971 20229972 20229973 20229974 20229975 20229976 20229977 20229978 20229980 20229981 20229984 20229986 20229992 20229994 20229995 20229999
```

Execution time : 3168 ms

- 총 걸린 시간은 3168ms 이 걸렸다.

C언어 내장함수 qsort사용 - 이름 정렬

Use qsort to name array
aaaliwozfp aadhbyrygh aacacaotw aafjlllebxu aafrektxgc aafueveuoj aagcranxlz aahonhdkw aajeefiuoc aalbojyfey alxusumxg aamkzubhle aaksuxlul aalbyvbfd aaoqrjbvog aaovaltovr aapnjadxst aarxmkcjgc aasxh gxozaavijzxmnx aavrxcufwc aawsoyuudz aaxbjbbjlf aaxjstmjfx aaytxnduhd ababaxnwpc abbgyxwgur abbwuntvg abeeknoiqi abegihjvdh abffndmvq abfsoqtscj abhjombjyk abhptmauv abhxnlgdh abhyqnaha abibxlxbi abjjddcayy abltihubxl abmrrlzcoc abmxmywfq abodcmrgew aboimsqanr abyoyohijlo abpelmidwy abpwsvzopg abrvolltmm absywejtey abupwykunt abvfjngcti abvglawjzp abvlhtusno abwpkjtyiw abwzktfhvb abyobafngr abysrhypnl abzfjbbrmkd acap bnzofe acaqieruno acaqzninrm acblyifnrg acbqsadipu accxbfkvg acfemakem acgdsjpxw acgsatduov acgzssiyq achzfsayuc acidmslez acjxdrzbd ackfbfrscx acmtxqowof acndylhn1 acohnjfdj acrgbqsnof acrkvmrweo acwbvtpia z acwifvmler acwjwolvzy aczdeybkm aczcsgejxs adcaavkfp adeeoylhsa adeepxablj adezfqhqaq adgirfrzej adhatvntdh adhdbreste adixugtdb adjdakukbr adjvzmtvdq adklhbokcm adkoxeerxr adlfcschnx adlfezcofi adlkhhjdrf adm lpccckp adnjkfukwq adoixobdt adokyfrys adrjzdbclm adrlonvfbm adtxhfenqj adxtnzhjrm adzqaulcia aeabdsxgb aeadpgflp aebbjknomy aeburnjdvi aecbfxtwg aeckunwkui aedousyjxh aeedyxwqln aefiohamqr aefjmmseus aefsonsi gt aehcqvcyp aehoqzqvz aehaqzsgul aekfjtividz aekfovptphc aellpwgkke aelnnnnjny aeltohkdo aemhysgojf aemqvjybrg aemxoexcfb aencrbries aenlpqlol aevodnuqkd aeqcjvwox aeqfzcjfez aeqimbpkmc aeqksxwqmu aeuhxlmre ae uonjkzif aevqxaikav aexeflxqz aeyhaalakk aeyypprex aeziltiktt aezinymmp afaqlqecay afbbqbzqyh afedqrhtew afejeeynvk affbnrdrzb affcvhwkey afgapxpjke afgxnufbyx afhdsbfboi afhojsrghd afkjtjrohb afknrrkrks afkqdy ifa afclsxvtlj afllwxtdk aflyrnqaz afluwzykcs afnbaanmgf afnkoxkhxd afnlfcxdft afnwkwjcfr afocaukuv y foradgrh afozjeixl afpiempdur afrdwttzi afrwkscor afststpowx aftedzmwoy aftvgjbvbu afvsxszzjx afwmguvlpj a fxprridj afxpvrtrrdl afxynatvby afytrebbye afzeicjoul afzubcrkbz afzbsnsqz aqagcxtcp agblhazfpv agbtzslinj agdksncaut aageajfgwo agfmrepbla aggcxlszqg aggnmdqeo aagpzlmvmt aggxrgliej aghpmgald agiyltusca agkxxz agup aglgxpotqz aglpizyqru agnrwulrui agogzinbgqjl agozsqzqz auptuhesej agqcbrsfy agrzpmunxh agsbrjyml agsfugfkr agsocymfe agssypzepj agtdamwuqq aguiavkzqz agvdhccky agwcvndrv agxrcbpftn agxxyriyco agztrtevrr agzzxzhiql ahabucnvlj ahcqkcvlej ahgnqdtrl ahhqnlawv ahhpkppls ahimflygsb ahiumdsx ahjpnxdjhj ahkejjyyjm ahmeweazx ahnjarkivd ahobkptmzw ahpurzobf ahpzigrbz ahqsnjabmz ahrcxgmqjn ahspq qyznl ahuwntsqqb ahvslgpxqz ahwectbxov ahzibfcxwr aiakuppopt aiceijcqit aichmvgtq aiclxcncls aienyjpsc aieumagblf aifhxdutmj aifkcjznfz aigtanyimi aihdfdhobo aiummccty aijaegjxqo aijmfarpqk aikqeblpsy aikunajydp

zoytijblct zozsvdlua zpdwjvnsl zpgzmdehhk zpjparauj zpltirdcip zplusfeaje zpmmwqnuyx zpnqpotbbv zpojlqidxk zpomvdbddp zpooplakf zpowdbbhse zpozlgsqdt zppdiavge zppfyziflx zpxqokamwj zprvspuan zpste pqnxj zptcgqsnmj zptloumbuk zptxwnngru zpunhxkrre zpvnpmhafj zpwogilxh zpxgvydbfy zpzwcqcbz zqacfqfrg zqajworpvc zqbplvlyt zqblmdxfx zqcfpyrmw zqcmwrvukf zqfdhuiwsz zqfvhobwds zqhuopfru zqfiuwcw zqismnwqcz zqkpaqlvick zqkwmepznm zqmrmrxfrg zqmkcayinu zqmnzskskz zqmrhtopbu zqnnyxjyym zqorfghrm zqglmmsum zqqlbiyjva zqqsckmtmx zqqyxkcvf zqrvcdqlms zqsbauljw zqtiuomga zquhqnkvjz zqwhafpbf zqwibkaafv zqwhthvjaen zqxf fsncjc zqyrchnuwu zqydzdrez zrbscfwmht zrcolmrpnv zrdbxvycoco zrdlnnfdrq zrfxjtmaya zrixgctnt zriyyarxrw zrjuaokjvq zrlpsuqplt zrlwqyathe zrnougsucz zroeqgrobd zrouhzyzg zrpayoaoem zrpccslvcf zrqjnzcqz zrqkiyvn zrrnbplaqw zrrqggwcxy zrsfyjedam zruueqsywl zruyomltf zrvqtjnyb zryjaqudw zrzomlomls zsbbyvudz zsbmwpqake zssbsezsksu zsdwtutmcq zseqdgtcmz zseyunkke zsgdpymvz zsgmmeldzy zsgnlaniyi zsgyshzqz zshcsrotwy zsqtcjky zslifeufku zslnznpfmo zsmemlrpfq zsovpxtjfe zsovwojlhs zspoatothu zsqmicpxom zsrqvtloc zsrcweuovz zssilbncls zstizbxuwu zsvtyrmar zswtkclxu zsxikupedn zsxzwojkjz zsytrgbfde zszlzbjmatx ztaarmvxdp ztbfczg hv ztdzxxitb ztfkejoahl ztfzltgdxl ztgoaplih ztdwhhbwz ztfibjsxl ztjowujie ztkpoedtx ztdnpwpxyy ztoegbnjuc ztpatnovtr ztpmcusy ztqogojapr ztqyxfhmez ztrkjieatf ztsjoglvmu ztsrkpebt ztthxlijiq zttjmjljdv ztsucubfd zttswcmyk ztxgakiws ztuegzxrmg ztwwrwpqly ztyrmqfnwh ztztkylebu ztzwulfjce zucenvzrmq zuckxmiidt zufujeywrr zufxldumje zuhdqhmvlz zuhhwbygsp zuhifusghm zuhibzny zuitmztfb zukjekyvt zukkmbtxih zulbmt wkp zulqamaibu zulvbqkyp zulzjawzto zumjctofhc zunfgjrwde zunetaqxz bonyamqww zuoljxfvoi zupaibllyba zuqwwdppab zurvnltrezo zusewxqom zusvgboehk zuslhbact zutxnkutsx zuwnhqimre zuxjyagcac zuzmlodpbk zuzuloyqrv vctlvjtgp zvekwnvvpz zvfetcgjfq zvfrvutecf zvldaiidd zvhcrebijk zvizauewor zvlpbljfiw zvlnyfmciz zvmfcoqaq zvnhvcpcueq zvmlfajei zvopmzbv zvqcyjqd zvqgacywv zvraphydpuf zvthtnwv k ztvrevbsy zvyajcggul zvyv ptbj zvznwijzr zwaymttkxv zwbwlaisj zwbwontcdt zwdcvmyhv zwdlkouvbc zwebkjwepx zwffhylaxt zwfpitvfnf zwfzigcxk zwgmdabive zwiuvmbni zwiqfgzjz zllbaigrp zwmkcmwzv zwnnmfqplp zwpliculpj zwpmlhbjh zwpwucrafh zwpzgbgypi zwqitfsvlt zwqkrbftli zwrxihjmx zwskvucehv zwspnudrox zwsyfaetmz zwtyhuktha zwudcdkxhj zwobuuwyn zwxtlimqbg zwytqmeevz zwzdkrodi zqamxvqfz zqawgfifsl zqbrfyevmp zqjcjbxk zqfcnszvdi zqgztzfwz zxht dhowz xigrlmnde zxkgceeuund zxlkukeklt zxmzbkyqul zxmzdjkvob zxcnpxgtye zxoemewgg zxokcegvhk zxoutxzmoh zxqztaijyf zxrabotnav zxrorkfsfk zxryztlq zxsqqlbpde zxtdjryxtq zxtunmsrx zxtwpubii zxuzfiggrn zxvmpfbhdk zxvsvvalmdl zxczgpbof zwxlmehmll zxyvjswbfs zxzpyieycg zyaidokqd zybajdvfa zycedtfk zyezoxyiyf zyfayvcmw zyffedsdb zyfgmyinfz zyhfnbjazp zyhlxtatzc zyhmupcfn zyioqputy zyiqpjvhab zyjkmhtby zyjmqktyf zy nmyfu zylhiprvno zyllworxaj zymbxlnbda zymvrfœul zyncjzlosx zynsuejjzq zynyxpoltj zyozkotaux zyqfapzla zyrisubqeo zyrvfmwjxg zyrygzuzdt zyutisajyy zyvfmfktzm zywfencwgy zywfxaekr zy xmzovdtn zyufjbznd zyzztzbs k zzajxjzizx zzbrdvovss zzcgjfaqzd zzckymwoim zzcpjjrvcc zzcssusieg zzdjchvesw zzglidmluj zzhgwvcic zzhgwqelh zzkdaczmd zllgusauj zzmqlmlulc zzmghbqpk zzmovcmyp zzzpfcvlnm zzzqzbzciy zzzrrwsube zfsrahz

Execution time : 2436 ms

C언어 내장함수 qsort 사용 – 이름 정렬

- 총 걸린 시간은 약 2436ms정도 나왔다.

C언어 내장함수 qsort 사용 - 번호 정렬

```
01097985752 01097989384 01097989606 01098007698 01098012886 01098014383 01098014946 01098017769 01098018398 01098021959 01098026168 01098043733 01098052148 01098056468 01098070564 01098071557 01098073722 0109807375  
0 01098079355 01098091363 01098092235 01098100536 01098104766 01098109585 01098111259 01098117812 01098128236 01098133299 01098136643 01098151723 01098152810 01098159884 01098163864 01098166590 01098167465 01098173  
105 01098182986 01098188902 01098189442 01098194315 01098195201 01098198836 01098208802 01098209370 01098209668 01098211032 01098214444 01098216917 01098217529 01098222598 01098223293 01098223594 01098223888 0109825542  
25542 01098237999 01098247878 01098254701 01098255481 01098257837 01098274266 01098278053 01098278098 01098279853 01098282416 01098285244 01098288910 01098306087 01098310186 01098314952 01098319088 01098320475 01098323925 01098325066 01098331124 01098335752 01098344680 01098346877 01098349641 01098350836 01098357644 01098365713 01098367646 01098368417 01098377236 01098378256 01098378652 01098379918 01098398738 01098399978 01098401674 01098404717 01098405291 01098408265 01098416719 01098416950 01098423234 01098432603 01098437388 01098437481 01098441331 01098453686 01098458912 01098463160 01098463884 01098465463 01098472835 01098473803 01098483322 01098492050 01098499922 01098507191 01098507232 01098511220 01098518543 01098530590 01098539364 01098541666 01098543368 01098545894 01098551185 01098554011 01098560610 0109856495 01098565946 01098569505 01098570507 01098573703 01098575728 01098575972 01098579345 01098591087 01098596540 01098602153 01098605855 01098607563 01098612878 01098618751 01098638858 01098640353 01098642050 01098652  
135 01098662851 01098668018 01098677374 01098683337 01098688780 01098693175 01098697740 01098700996 01098703153 01098704645 01098711590 01098713686 01098714029 01098714086 01098718985 01098720775 01098721583 01098722091 01098724313 01098727330 01098734470 01098737205 01098739212 01098743494 01098748187 01098749424 01098751109 01098765036 01098765460 01098769320 01098769666 01098771766 01098773194 01098773364 01098773801 01098780482 01098780802 01098785008 01098789352 01098789685 01098792368 01098801879 01098808534 01098821995 01098823410 01098825801 01098828170 01098828989 01098829970 01098836606 01098838011 01098838333 01098841809 01098845174 01098846543 01098856346 01098858010 01098859744 01098875469 01098884961 01098886481 01098899142 01098912836 01098914763 01098915670 01098916316 01098917854 01098926757 01098927136 01098931535 01098933800 01098945035 01098947099 01098949924 01098957048 01098962909 01098966670 01098967600 01098992352 01099001002 01099020252 01099022887 01099027882 01099028591 01099032700 01099038828 01099042071 01099050612 0109905303  
7 01099053409 01099053583 01099057434 01099066662 01099068478 01099070480 01099073603 01099075647 01099082480 01099082909 01099089678 01099091437 01099095446 01099105617 01099112032 01099126878 01099133377 01099158414 01099162536 01099164903 01099166782 01099169965 01099170127 01099170197 01099172117 01099177203 01099177447 01099179059 01099182143 01099182441 01099193450 01099194683 01099194940 01099210746 01099220279 0109925421 01099230174 01099244520 01099245458 01099249370 01099255703 01099257847 01099261211 01099268197 01099269283 01099269925 01099270218 01099272634 01099275544 01099280907 01099286542 01099287190 01099295569 01099296465 01099302416 01099302824 01099303449 01099305098 01099309202 01099315732 01099323565 01099342803 01099344513 01099350574 01099351117 01099352250 01099364393 01099372775 01099373302 01099374524 01099378110 01099379389 01099381740 01099386585 01099391366 01099393670 01099397043 01099417281 01099417481 01099424856 01099426292 01099429897 01099441588 01099444625 01099450927 01099450948 01099463672 01099465077 01099469678 01099477419 01099478490 01099484529 01099499554 01099503421 01099506009 01099520830 01099531258 01099531484 01099537153 01099547521 01099548562 01099556054 01099561145 01099570396 01099572592 01099575168 01099582039 01099582565 01099583995 01099586072 01099597296 01099605761 01099613335 01099614964 01099619412 01099623936 01099625118 01099629180 01099636009 01099638814 01099639161 010996382 01099662611 0109967755 01099678289 01099680932 01099687789 01099689999 01099691392 01099691968 01099693997 01099695325 01099697293 01099697822 01099704321 01099707169 01099707214 01099723416 01099742283 01099745534 01099754025 01099754670 01099765599 01099773573 01099780416 01099782452 01099787496 01099789736 01099790870 01099793838 01099800912 01099802152 01099805154 01099834672 01099840591 01099843663 01099846566 01099852216 01099853539 01099854535 01099862303 01099884559 01099884831 01099890983 01099898150 01099901088 01099903377 01099908339 01099910026 01099920251 01099928771 01099930696 01099931937 01099933007 01099951358 01099959557 01099962153 01099966790 01099971836 01099978557 01099979252 0109997236  
Execution time : 3183 ms
```

- 내용이 너무 많아 밑부분만 가져왔다.
- 약 3183ms정도 걸린것을 확인 할 수 있다.

실행시간 측정

```
94 double check_qsort_time(char arr[ARR_SIZE][12], char origin[ARR_SIZE][12], void fp (void *, unsigned long, unsigned long, int (*)(const void *, const void *)))
95 {
96     clock_t start, end;
97     start = clock();
98     fp(arr, ARR_SIZE, sizeof(char[12]), (void *)strcmp);
99     end = clock();
100    double runtime = (double)(end - start);
101    print_array(arr);
102    printf("Execution time : %.0lf ms \n", runtime);
103    init_array(arr, origin, ARR_SIZE);
104    return runtime;
105 }
```

- 실행시간 측정은 qsort의 경우 위의 함수를 만들어 사용했다.
- qsort 시작 전 후에 시간을 저장한 후 빼서 runtime을 저장했다.

내가 만든 정렬 알고리즘

- 다음은 직접 짠 코드로 정렬한 결과이다.
- 분량이 너무 많아 캡쳐할 때마다 다시 실행한 후 캡쳐한 거라서 그 때 그때 사용된 섞인 배열이 다르다.
- 따라서 여기에 나온 실행 시간은 참고만 해두고
- 후에 공통된 배열을 정렬하는 데 걸리는 시간을 정리한 표를 따로 캡쳐해 비교하겠다.
- 분량이 많아 실행 결과의 뒷부분만 캡쳐했다.

내가 만든 quicksort – 학번 정렬

```
20229153 20229155 20229157 20229159 20229160 20229162 20229163 20229165 20229166 20229167 20229168 20229169 20229170 20229173 20229175 20229178 20229179 20229181 20229182 20229183 20229184 20229185 20229186 20229187 20229189 20229190 20229191 20229193 20229195 20229196 20229198 20229200 20229204 20229205 20229207 20229208 20229209 20229211 20229213 20229214 20229215 20229220 20229221 20229222 20229226 20229228 20229233 20229234 20229236 20229237 20229241 20229242 20229243 20229246 20229247 20229251 20229253 20229257 20229258 20229259 20229262 20229266 20229267 20229271 20229272 20229274 20229275 20229276 20229277 20229278 20229281 20229285 20229286 20229287 20229288 20229289 20229290 20229291 20229293 20229296 20229297 20229299 20229301 20229304 20229306 20229307 20229308 20229310 20229311 20229312 20229313 20229316 20229317 20229318 20229319 20229322 20229325 20229328 20229329 20229330 20229332 20229336 20229337 20229338 20229341 20229343 20229345 20229346 20229347 20229349 20229350 20229353 20229356 20229359 20229362 20229363 20229365 20229366 20229367 20229368 20229369 20229372 20229373 20229374 20229376 20229378 20229380 20229385 20229386 20229390 20229392 20229393 20229394 20229398 20229399 20229400 20229402 20229403 20229405 20229414 20229415 20229418 20229419 20229420 20229422 20229424 20229426 20229427 20229428 20229430 20229431 20229435 20229436 20229437 20229438 20229441 20229442 20229447 20229448 20229450 20229453 20229454 20229455 20229457 20229459 20229462 20229463 20229469 20229472 20229473 20229474 20229476 20229479 20229480 20229482 20229485 20229486 20229489 20229490 20229491 20229492 20229493 20229495 20229496 20229497 20229501 20229502 20229507 20229508 20229509 20229512 20229514 20229515 20229516 20229517 20229520 20229521 20229525 20229526 20229527 20229529 20229530 20229533 20229536 20229538 20229540 20229541 20229542 20229544 20229545 20229548 20229549 20229551 20229552 20229554 20229556 20229557 20229560 20229561 20229563 20229566 20229568 20229569 20229570 20229571 20229573 20229575 20229576 20229577 20229578 20229580 20229581 20229586 20229588 20229589 20229590 20229591 20229592 20229596 20229598 20229599 20229600 20229601 20229603 20229604 20229605 20229608 20229614 20229616 20229617 20229621 20229622 20229624 20229626 20229628 20229629 20229630 20229631 20229632 20229634 20229635 20229637 20229638 20229639 20229640 20229641 20229643 20229645 20229648 20229649 20229651 20229654 20229656 20229657 20229660 20229661 20229663 20229666 20229668 20229669 20229670 20229674 20229677 20229679 20229682 20229683 20229686 20229689 20229690 20229691 20229692 20229694 20229695 20229700 20229702 20229704 20229707 20229709 20229710 20229711 20229712 20229715 20229717 20229718 20229719 20229721 20229722 20229723 20229724 20229727 20229728 20229731 20229732 20229734 20229735 20229737 20229739 20229740 20229741 20229742 20229745 20229750 20229751 20229758 20229759 20229760 20229762 20229766 20229767 20229768 20229771 20229772 20229774 20229775 20229776 20229777 20229778 20229779 20229780 20229781 20229782 20229783 20229785 20229788 20229789 20229790 20229791 20229793 20229794 20229798 20229799 20229800 20229806 20229808 20229809 20229810 20229812 20229813 20229817 20229818 20229819 20229822 20229824 20229826 20229827 20229831 20229833 20229834 20229835 20229836 20229837 20229839 20229843 20229844 20229846 20229848 20229853 20229855 20229856 20229859 20229860 20229863 20229864 20229866 20229868 20229869 20229870 20229871 20229874 20229875 20229876 20229879 20229880 20229883 20229885 20229887 20229888 20229891 20229893 20229895 20229898 20229902 20229903 20229905 20229908 20229909 20229912 20229914 20229916 20229917 20229919 20229920 20229922 20229923 20229926 20229927 20229928 20229930 20229931 20229938 20229939 20229942 20229944 20229945 20229946 20229951 20229954 20229956 20229959 20229962 20229963 20229965 20229967 20229972 20229973 20229974 20229977 20229978 20229979 20229982 20229984 20229985 20229986 20229987 20229989 20229998Execution time : 9538 ms
```

내가 만든 quicksort – 0|름 정렬

zneiixpsbz znfldqfeeh znfugibegg znilweooga znircbfirn znjrqkhthw znojmjhlik znopdgpvue znounceck znprlgssej znpzlewazt znrvsfeafr znssjolmrh zntkbznusw znucovlmoo znufwqyrrm znymhgntth zoaiyzsyly zoblecfjcx zodwfmpybz zoezsdgwpi zofcuikzns zofjvtkbxj zofqjhwdm zofuecrii zogcdlicgg zogjaxyrob zohlebfru zohsoufbgc zoihzybeoo zoqlstpbv zojxbrpqug zokrpprpbz zololfdpnx zonpumpipa zonvsrlrnz zoogmcwnfr zoopxnzmka zoqvhpctt zotiscisnm zotwtdewja zotwxzhym zovgkohjvc zoypahadei zozkcnanln zozortrndo zpatfyyhn zpazmxpxz zpcabzngjh zpcqkilqbf zpdnzgxgt zpdvuqtfod zpenuvguny zpfpmwindu zpgwbictji zphqbmitij zphuszwixs zphxdtwppz zpmianenmz zpmlllovepu zpmouwgall zpmudoumha zpmwwcxatd zpmxhpgzna zpnisdrjnu zpnjlatzbz zppabrrngz zpryggfqeo zpshzcvmbh zpspnisvqt zpsueeaum zptgbcuuny zptmaulldy zpvcodicmn zpvoljwpbm zpvqdkchz zpxfksgme zpyrzilvah zpzulajwfn zqbelvuuki zqcgrovkjl zdanyoawm zqfysutpdv zqghotcsci zqgjolbmrm zqhkesfdda zriegpdweb zqinzpbyfc zqjgfngvoz zqlrvztbid zqmykkbbzo zqnngswro zqqlbdggf zqrhdzckbs zqrxdtsruy zquesnhiee zquzsincvb zqxdkvotof zqypdpqfoh zqyylgelhv zqzflouzy zrakdwenzf zrakpkmrbh zrarfrknod zrddxlwmub zrdodzkkqz zrdofxjyju zrduvectpq zreeyiisqz zreguncvlm zrfdwwxozg zrflkptpgg zrghzqldcg zrgyecntpr zrhtgbxxjs zrhznxujxf zrkdrxlqiv zrkizdznee zrkkmfurdh zrlimlzaef zrnsqnwfq zrnxjkksxv zrpbnmotrb zrpdgktdn zrrzuouevi zrsyamrrpc zrtbxdpjp zrtelvfzbs zrtifddhly zrtsyzpgtn zrvleyvfwb zrvpdhpdv zrwgoclgly zrwpgdfmpj zrzjfximto zsasdjosnf zsbildwhul zsepktfrvy zseprfnvgx zsggfwceb zsglbseahs zsgotgwjhx zsguvkzotg zshbhgkkl zsjamaznpb zsjvsdhkal zslvdngobi zsnippifvs zsnfgzurm zsoubtussj zsrilmkeqm zssbdqzdbc zssktjsdxj zssofxrbdn zswesjdlxe zsxinrzkpm zsxjkffri zsxqbmjddu ztafhxfjvb ztawezqfia ztbwyhneuf ztbdubjsc ztciznprx ztcsyrhlme zteeqkkipt ztefctpkod ztegakwutq ztegovwhm zteulpzruf ztfhhlhvryp zthgrjmqqg zthmfolrbs ztilhjcyhi ztiqggqoli ztjbgnwxax ztjtehnhe ztlniywex ztnpzczfxj ztofeneoei ztofkvaiyu ztrjtrpqrz ztrqrdrnjze ztseugqkjk ztsiadfbcw zttifhzhkf zttsgdwar zttvdoekuw ztvqksfyik ztvxqhfffz ztydsxitb ztyvkivzsm ztzbppavzs zuafjzrnsu zuaholcntv zuappmgwo zuccuivrejr zuclnmkjdc zudnpinxvw zuebpbjcvg zuesrxaxlt zuevcjglrp zufdozqjzf zufyqjywi zugnfgyecl zuhemlignn zuheshvsnk zuikxfgobr zuiyrqrrzq zunpenukma zupmmxcqvx zuqybjilqd zurkrnbgxc zuswyiibao zutqtewsbl zutxdsryml zuvkclyqbw zuvmgumfvq zuwfenlhep zuwlfygjmn zuxjbeemwz zuxlykraxy zuyiqwwlrs zylipwkky zuzmpmbjzr zvaquftimx zvaxyvcrop zvbloouxcj zvbeasdry zvctslvabg zdahzyjwh zvejurxnx zvfjzvjdgs zvfofrplxu zvgbarjyar zvgvufumkq zvhvnenwdk zvinstdfhe zvjsxpvcxi zvkweguzg zvlriumnogu zvlvvvmmrv zvlwdxhvv zvmivetocf zvmlndntj zvnhelxiub zvnknggvzv zvnwcmabajh zvnxmience zvohnrcbjt zvpkmbtcjq zvqtabomlr zvslagcchq zvsnynufnq zvtmtddhrg zvtxhuotpz zvubfgutte zvxdriduo h zvxmniikod zvxuzpctbd zvyitvftls zvzkstubtzw acfspnuk zwbotrqgl zwccezimfk zwclxkdrph zwdjuhawks zwdkkzamnz zweilyeril zwflhhyeg zwgeyvfdgi zwgnflgmdh zwadpetvn zwhlwpxpywq zwhsepmutx zwkbkgwcsb zwlocxfave zwmnnidgjz zwmykqyjxh zwpusrutuj zwqdyhzadk zwraqxqatlj zwrzqnhcl zwstghfzbg zwuhmvsqrv zwvqcofiox zxuclword zwyhugjczq zwyssombtd zwywdefmou zwzv1mbgzq zxamdaiggw zxbigygayn zxxytvwuk zxffcurjzt zxftizpdet zxgsqhsny zxhgdihvxq zxjkffxbwe zxmexnjgan zxmzlgvuan zxnpkjmj zxrdrlyalz zxrxrxlerz zxsmzcivqa zxtasyiakd zxudbgvfhz zxuwtijuu zxxwsjzsuo zxxkvgbhga zxypckwlen zxyzddjmmf zyfazcbley zyghwvjpg zyhhqxygyze zyhvqnfwil zylgbgbusu zylnzexypz zymkegrzyi zynfzlwsjg zyoejtawl zyqeohrpn d zytrtsnweg zytjexpede zytqqyvqjl zyuausbtkx zyvrnrusrc zywhrjqkhw zywkpuxetj zywobstyxc zywsprokxg zywybcnwry zyxpfcykn zyxrvgszck zyylgrzzim zyyofjfdaw zzbbcafawg zzcgdfnyjl zzdkutuwss zzdyasihwz zzfhqmiwk zzgbhaiwbs zzgomxyrlj zzhwgzcbgt zzjscztxai zzlramkio zzneprsov k zzouxmgtiy zzovnxcjft zzqmlsizxs zzsbgeqwde zzshqdxksy zzssxhylvx zzvftjpngh zzvpmckzpz zzzxtkyjnn zzzzqggokd zzyfjdelna zzyidujck zzyrpqiiky zzzubeyxqy

Execution time : 8073 ms

내가 만든 quicksort – 번호 정렬

098302316 01098307495 01098309804 01098309910 01098311905 01098314882 01098323835 01098340208 01098341868 01098342643 01098347089 01098359303 01098359558 01098360385 01098370665 01098371105 01098372450 01098374325 01098379808 01098380973 01098383425 01098390707 01098396525 01098411557 01098419730 01098421807 01098423976 01098427275 01098429511 01098431163 01098438166 01098445110 01098448889 01098450426 01098452213 01098458596 01098461303 01098467886 01098476029 01098477249 01098483860 01098485905 01098486424 01098488233 01098501882 01098502334 01098513080 01098529430 01098531915 01098536160 01098542625 01098549770 01098553262 01098553907 01098553980 01098554409 0109856072 01098565402 01098566139 01098569847 01098570566 01098571866 01098573388 01098574766 01098581640 01098583028 01098591113 01098592253 01098593725 01098598621 01098602566 01098605965 01098606005 01098622092 01098623652 01098627090 01098635984 01098638289 01098647598 01098653500 01098655621 01098667501 01098674993 01098677996 01098690488 01098697395 01098699122 01098704731 01098706862 01098707230 01098715485 01098721930 01098723632 01098728961 01098729170 01098734236 01098735409 01098736938 01098738605 01098741792 01098747681 01098750154 01098751748 01098756814 01098761927 01098767798 01098774373 01098774893 01098783358 01098829275 01098831090 01098835200 01098838632 01098841863 01098857332 01098858108 01098858590 01098860916 01098861607 01098864450 01098867870 01098872619 01098873429 01098882409 01098892294 01098894380 01098899761 01098903989 01098906318 01098907174 01098907789 01098934906 01098934964 01098936859 01098936979 01098941943 01098944129 01098962238 01098966866 01098976873 01098985729 01098991751 01098996863 01099003044 01099006201 01099007331 01099018759 01099020708 01099022476 01099035605 01099037750 01099038697 01099039073 01099041069 01099043552 01099046586 01099048140 01099051558 01099056162 01099064141 01099090282 01099091748 01099098924 01099101244 01099104425 01099115623 01099117794 01099132251 01099133026 01099136145 01099136613 01099137327 01099138334 01099149010 01099150876 01099161861 01099180650 01099182107 01099185479 01099194982 01099195889 01099197347 01099205533 01099207014 01099213284 01099230153 01099232937 01099235098 01099235974 01099257697 01099261945 01099270811 01099290785 01099297894 01099301470 01099310795 01099314281 01099318394 01099319411 01099319545 01099322365 01099324785 01099332680 01099333757 01099336499 01099344259 01099346366 01099360779 01099370682 01099373333 01099381197 01099391080 01099391108 01099412000 01099414101 01099420085 01099431000 0109943832 01099442823 01099448364 01099449409 01099456106 01099464107 01099464179 01099464810 01099465119 01099465716 01099469221 01099470966 01099474930 01099476660 01099477409 01099488813 01099498722 01099505585 01099506426 01099521153 01099525292 01099529687 01099536683 01099544206 01099547582 01099552223 01099555595 01099563070 01099564940 01099570490 01099571336 01099577676 01099578211 01099578820 01099582344 01099587766 01099588714 01099592998 01099593628 01099600199 01099604489 01099605560 01099609088 01099615730 01099622957 01099623196 01099629541 01099633507 01099635039 01099635726 01099638940 01099639911 01099644430 01099645519 01099662498 01099663316 01099665856 01099667198 01099675236 01099678265 01099682529 01099692730 01099695 01099710300 01099713847 01099717442 01099718571 01099722975 01099732462 01099739206 01099740513 01099757903 01099767200 01099773859 01099778744 01099780094 01099787198 01099789836 01099791198 01099803247 01099804331 01099813904 01099819338 01099821196 01099823611 01099826165 01099828172 01099828650 01099843113 01099843317 01099845070 01099851214 01099860899 0109986193 01099875427 01099877281 01099879032 01099881141 01099884707 01099904497 01099911531 01099911533 01099919412 01099928466 01099937974 01099941463 01099943343 01099951570 01099953066 0109995174 01099970279 01099975512 01099978473 01099993961 01099995987 01099999969
Execution time : 9284 ms

내가 만든 선택 정렬 - 학번 정렬

229209 20229212 20229213 20229214 20229215 20229220 20229222 20229223 20229224 20229225 20229229 20229230 20229231 20229232 20229233 20229234 20229235 20229236 20229237 20229238 20229239
20229240 20229244 20229245 20229246 20229247 20229251 20229252 20229253 20229254 20229258 20229259 20229261 20229265 20229266 20229267 20229269 20229272 20229273 20229275 20229276 2022927
9 20229280 20229281 20229282 20229283 20229284 20229285 20229286 20229287 20229289 20229290 20229293 20229303 20229304 20229305 20229306 20229307 20229308 20229309 20229313 20229314 20229
316 20229317 20229318 20229320 20229322 20229323 20229324 20229328 20229330 20229332 20229336 20229339 20229340 20229341 20229343 20229344 20229347 20229348 20229349 20229353 20229354 202
29355 20229356 20229358 20229360 20229361 20229363 20229365 20229366 20229371 20229373 20229381 20229382 20229386 20229387 20229388 20229389 20229390 20229392 20229395 20229398 20229400 2
0229402 20229405 20229406 20229407 20229412 20229414 20229416 20229418 20229420 20229423 20229424 20229434 20229435 20229436 20229438 20229439 20229440 20229442 20229443 20229446 20229447
20229448 20229455 20229457 20229459 20229461 20229471 20229474 20229476 20229478 20229480 20229482 20229483 20229485 20229488 20229490 20229494 20229496 20229497 20229499 20229502 202295
03 20229504 20229508 20229509 20229513 20229514 20229517 20229518 20229519 20229520 20229526 20229527 20229528 20229529 20229538 20229539 20229541 20229542 20229547 20229548 20229549 2022
9550 20229551 20229552 20229557 20229560 20229563 20229565 20229566 20229567 20229571 20229574 20229576 20229577 20229579 20229580 20229584 20229588 20229589 20229591 20229594 20229596 20
229597 20229598 20229599 20229600 20229601 20229603 20229604 20229605 20229606 20229612 20229613 20229615 20229617 20229620 20229621 20229623 20229624 20229626 20229627 20229630 20229632
20229634 20229637 20229639 20229640 20229641 20229642 20229645 20229647 20229650 20229652 20229653 20229655 20229657 20229658 20229661 20229665 20229668 20229669 20229673 20229674 2022967
6 20229678 20229681 20229682 20229684 20229686 20229687 20229689 20229690 20229697 20229699 20229703 20229707 20229710 20229711 20229717 20229718 20229722 20229723 20229727 20229730 2022
9731 20229734 20229735 20229736 20229737 20229738 20229739 20229740 20229741 20229743 20229744 20229745 20229747 20229748 20229749 20229751 20229752 20229753 20229754 20229762 202
29764 20229765 20229766 20229768 20229770 20229774 20229775 20229776 20229780 20229782 20229786 20229787 20229788 20229789 20229790 20229791 20229792 20229798 20229799 20229800 20229802 20
0229803 20229804 20229808 20229809 20229811 20229813 20229814 20229817 20229819 20229821 20229822 20229823 20229825 20229826 20229827 20229828 20229830 20229832 20229833 20229834 20229836
20229837 20229839 20229840 20229844 20229845 20229846 20229848 20229852 20229855 20229856 20229858 20229859 20229862 20229866 20229869 20229872 20229877 20229878 20229879 20229881 202298
82 20229883 20229884 20229888 20229889 20229890 20229895 20229898 20229899 20229901 20229905 20229907 20229908 20229909 20229916 20229917 20229918 20229919 20229920 20229921 20229922 2022
9923 20229924 20229925 20229927 20229929 20229930 20229931 20229935 20229937 20229938 20229940 20229942 20229946 20229952 20229957 20229958 20229959 20229961 20229966 20229968 20229970 20
229973 20229979 20229983 20229985 20229986 20229987 20229988 20229991 20229994 20229995 20229997 20229999
Execution time : 1216088 ms

내가 만든 선택 정렬 - 이름 정렬

znhhttxse zhlabtvays zhldddotujg zhltntkla zhkkjjwne zhlcwgqrz zhllkiseax zhmtggusc zhnsasraaxu zhnonrntbs znoqxyptk zhnpqewgzye zhqmrmbdek zhsmalikovw zhsgmmcgyp zhnrbeakagw zhswxijqgi zntprxisdx znwdgmsin znwlyfwrrt zxnkffosvz zxvagrzbz zoatmvvfxe zobbupefk zobdixsqhr zoedwheniyo zoenspnsei zofftxepaa zoffxsqxrs zofqykmv zogmslmcg zogsxzahri zogwolbbdp zohdgxnuqm zohoudyppr zojnjftjon zoksgrmyfe zoldtzdfb zolhztzcnr zolnjhzabt zomiorlcau zonaltsgv zonsvippdm zooavyddzw zopftxfrd zoqiohdrf zorhtmsomi zosjhqdlb zosoubzybm zosrkqeuc zotmtiftjt zoucexwyew zounfurzjp zouzskeywr zoyswfbkyu zoznhqjpcu zpamotmhfe zpanyflqxp zpbvbvenql zpbwygkapv zpdoyyjckf zpfjdmpku zpfqbtqrsk zphymivswf zpiilimofy zpiqltongi zpirkoiaqy zpiymwhxj zpjriabejt zpjsbiobse zpmbrhyhlo zpmubobnui zpkfglexl zppdlsdfmd zpkdiwanw zpqofmdkxp zprbagokni zprttxnumz zpsjarehzi zpsotbfesl zpthgpyuyp zptifsgkcd zptseuscdh zpucimhyke zpulknkwkr zputyedlba zpvhjpwtdt zwpwspavgv zpybyravpw zqamgwaiyq zqavhibbqqu zqdyunaacs zqebtdbfpn zqelekpnln zqfdomfkpn zqffveneyl zqfrpcdkal zqgdsikncm zqgkbnbclm zqhlytbooe zqkhtejowe zqkqvsleyf zqkryjlznl zqmfycgbz zqmnpbefho zqnoqqefnq zqnzhskti zqpkbyyjtn zqpbqvtrm zqprbwoyom zqahhjmtjf zqrbsxajth zquwgubvna zqwgqucssn zqwozxzoto zqwwgbyagg zqxcpjuzss zqxddgaepg zqyfwtxcab zqzinqbwk zrbcvenyjc zrchwskghs zrcvghchc zrdzxuyodc zreigjeiyo zreirdnusl zrekoffwvp zrgcvcgagp zrmxosxvh zrolctshod zroqisbqfb zroqlgwjnw zrosizvndk zrpmleriy zrqaakejtf zrqxmxyislj zrskptgqkj zsappxmlqc zscalpllf zscbeqruta zsdtkciida zsfdjmmisa zsfqnrggzv zsfudobule zsgczsaxbl zsgxrrckrq zsugusmafo zsuobwjfq zsvganfjbe zsvnxyitzr zsvqtgyuhj zsvznvmnld zsxnhktvf ztdcnrcenn ztdyhayss ztecqoapbv zteitzxwev ztgodxlavf ztgwoyxvh ztiytzlrhp ztjbkkeywp ztjeetedale ztjobdzogr ztjyoajaux ztlxgukcxg ztnubteiqf ztpqznnvmp ztqgiyxadc ztqhxryyhg ztqpxqutuy ztqwwqjquv ztrkqfndnc ztyzzmrtbl ztzmqacxb zuavzhvwcx zucfhqnyrh zuctitcbbo zucusfxjnn zugdsllolh zuhbgtukpy zuijpgnuyr zuuvkdlnfb zuvelhhaxi zuvuistwan zuvyuszpva zuwjkepofj zuxflgkkfi zuyavijrjx zuydzchorr zuzpnnzfpa zvjqzwwheyk zkigmxtgr zkwrppqwe zvnghiqnlz zvounnpmrz zvpyhnqlfz zvrlgdwosi zvrplqzvfg zvrsjzejk zwbkuacxcw zwcovtzwt zwcqcxyfnt zwctbgtneg zwczyezjoy zwdhsmskfhc zwemcyvcj zwesofyjde zwifghtbth zwrhjmtwkt zwvgobfvp zwzijtojgj zxabjorpfz zxbrcmopmg zxcwmsqsjh zxddthdaou zxdocvqipu zxejzmkisx zxfjloqbgz zxivricyxk zxjendnqea zxnjxrktzg zxnyjpwak zxojrxedza zxpgrzfwrol zxplxedujl zxqzvkkpvp zxrnkxoetv zxrouwqebf zxsawwhtoj zxsmspamgd zxsplaxibb zxulwacmky zxunzinefr zxvvpasnr zyafxoadsp zyamthvlut zybviigsm zycmlwiiw zyctvzokqj zydqnfufwv zyekeetnqj zyffrgxqay zyffxgturr zygjstdwha zyhvjcvrfq zyiaokkpdz zyizybbqhz zyjmjivom zyjvsyfiss zyljuwwdii zylyfcsejl zynifeiccc zyoejlncca zyoeeueijqz zypfrgfkh zypgrmiqst zypywymthj zysnfydedz zysugbvewt zytzzknbf zyvpraxnkc zywsyqtctu zyxbloipsj zyxtwdjhle zyydbnaewt zyztrljled zyzwhddyif zzaaknlqmi zzavcprxow zzcgqnxnmn zzeaylkdeb zzeendmlpt zzendqhccd zzfmzoarfj zzibzehemn zziecufaen zzjafmjmyw zzkiqvuonq zzkooglvfl zzmpukfnr zzmyyksoat zzngazrduu zzngsvxsep zzooqxfdbe zzpcmkyhjg zzqkfokhld zzsaidrhat zzuoqpruiw zzvzowsjdz zzxsqypwbj zzyqpkemmkk zzzjuejeeu zzzzedwlo

Execution time : 518365 ms

내가 만든 선택 정렬 - 번호 정렬

01098620030 01098620668 01098623373 01098624266 01098632905 01098635489 01098639179 01098645070 01098650236 01098651659 01098656427 01098663540 01098663579 01098664341 01098669853 01098670959 01098677486 01098679889 01098680926 01098691038 01098694550 01098699565 01098702622 01098708261 01098710155 01098710925 01098714807 01098717080 01098720185 01098726095 01098730481 01098735093 01098737661 01098737809 01098743684 01098752903 01098768448 01098775827 01098791813 01098792098 01098796755 01098805824 01098813241 01098817339 01098820176 01098821947 01098826789 01098829665 01098835882 01098843172 01098845913 01098846700 01098847043 01098849616 01098850686 01098850829 01098852605 01098853466 01098872640 01098875981 01098876485 01098876563 01098893636 01098894828 01098897244 01098899140 01098906670 01098907234 01098907846 01098910613 01098913824 01098922982 01098923559 01098930305 01098932964 01098938533 01098945507 01098950293 01098962422 01098964263 01098970169 01098972237 01098980750 01098983771 01098994514 01098999277 01099013419 01099019387 01099022714 01099028334 01099037312 01099040094 01099043266 01099048867 01099052374 01099053869 01099068154 01099069852 01099072777 01099076920 01099079923 01099085513 01099089676 01099095092 01099097444 01099111984 01099115358 01099120582 01099120810 01099121277 01099125821 01099131121 01099132086 01099132851 01099138011 01099145296 01099150658 01099165158 01099170635 01099183556 01099186802 01099194260 01099202842 01099215778 01099220059 01099221139 01099223180 01099230272 01099231099 01099232272 01099233320 01099233341 01099238537 01099241134 01099243127 01099243536 01099250131 01099250640 01099252959 01099257317 01099259169 01099260979 01099267461 01099267659 01099269056 01099269154 01099269810 01099272402 01099272630 01099278979 01099279167 01099280898 01099283541 01099284495 01099297638 01099308756 01099313021 01099313922 01099316478 01099318883 01099328677 01099331901 01099335204 01099337873 01099338741 01099355474 01099356465 01099370210 01099379958 01099383926 01099396789 01099398286 01099405323 01099406344 01099417638 01099418374 01099424980 01099437655 01099447168 01099454571 01099465386 01099480439 01099483021 01099483966 01099484039 01099489322 01099502465 01099519800 01099524530 01099530235 01099530604 01099536831 01099545907 01099550577 01099551690 01099552005 01099557123 01099557525 01099559617 01099561000 01099573516 01099577284 01099581071 01099584869 01099589019 01099593883 01099600542 01099606128 01099608909 01099612888 01099616474 01099624459 01099631325 01099632901 01099645470 01099648249 01099656119 01099664084 01099674975 01099675512 01099680944 01099709012 01099710223 01099723055 01099731806 01099732726 01099745427 01099760506 01099761892 01099762384 01099766974 01099769967 01099773981 01099775775 01099777952 01099781148 01099789283 01099794823 01099801336 01099803079 01099805373 01099809392 01099810441 01099811443 01099820643 01099826891 01099828128 01099836937 01099838141 01099838268 01099847299 01099862498 01099863220 01099865773 01099870354 01099873983 01099879292 01099883969 01099891885 01099900668 01099904404 01099908381 01099910126 01099911198 01099913998 01099919900 01099930320 01099934326 01099934712 01099940104 01099945578 01099949521 01099951649 01099956803 01099959577 01099959714 01099963186 01099970445 01099976020 01099978148 01099978698 01099980207 01099982676 01099983240 01099984978 01099995785 01099996251
Execution time : 1047123 ms

내가 만든 힙 정렬 - 학번 정렬

0229475 20229476 20229477 20229478 20229479 20229481 20229482 20229483 20229484 20229487 20229488 20229489 20229491 20229495 20229497 20229498 20229499 20229500 20229501 20229503 20229504
20229506 20229507 20229508 20229514 20229515 20229517 20229518 20229519 20229522 20229524 20229526 20229527 20229528 20229530 20229531 20229532 20229534 20229536 20229537 20229538 20229539
20229540 20229541 20229542 20229543 20229544 20229546 20229548 20229553 20229554 20229555 20229556 20229557 20229559 20229562 20229564 20229565 20229566 20229569 20229573 20229575 20229576
20229579 20229581 20229582 20229584 20229585 20229586 20229588 20229589 20229591 20229592 20229593 20229598 20229602 20229603 20229604 20229605 20229606 20229609 20229610 20229611 20229612
20229617 20229618 20229619 20229622 20229623 20229626 20229627 20229630 20229638 20229639 20229642 20229643 20229647 20229648 20229651 20229652 20229653 20229654 20229660 20229661 20229664
20229666 20229669 20229672 20229679 20229680 20229682 20229683 20229684 20229685 20229688 20229689 20229690 20229691 20229694 20229697 20229700 20229701 20229703 20229705 20229706 20229707
20229708 20229709 20229710 20229713 20229714 20229715 20229716 20229717 20229721 20229725 20229726 20229727 20229728 20229729 20229731 20229732 20229733 20229735 20229736 20229737 20229738
20229739 20229740 20229741 20229748 20229749 20229750 20229751 20229752 20229753 20229754 20229756 20229757 20229758 20229762 20229763 20229764 20229766 20229767 20229768 20229772 20229774
20229775 20229776 20229777 20229778 20229781 20229783 20229784 20229785 20229786 20229787 20229788 20229791 20229793 20229795 20229797 20229802 20229803 20229806 20229808 20229809 20229810
20229811 20229814 20229816 20229817 20229819 20229823 20229825 20229828 20229831 20229832 20229833 20229834 20229836 20229837 20229839 20229845 20229846 20229848 20229849 20229850 20229852
20229854 20229855 20229856 20229857 20229860 20229861 20229862 20229866 20229868 20229872 20229874 20229875 20229876 20229880 20229883 20229888 20229891 20229892 20229893 20229895 20229896
20229898 20229899 20229900 20229901 20229903 20229905 20229906 20229910 20229914 20229915 20229916 20229917 20229920 20229921 20229923 20229924 20229926 20229927 20229928 20229931 20229935
20229938 20229940 20229941 20229945 20229946 20229949 20229950 20229951 20229953 20229957 20229959 20229962 20229964 20229973 20229974 20229975 20229976 20229977 20229978 20229979 20229980
20229981 20229983 20229985 20229986 20229987 20229990 20229991 20229994 20229997 20229998 20229999
Execution time : 6934 ms

내가 만든 힙 정렬 - 이름 정렬

nljkashx zoockfmxvm zoevhgilm zoooqzwody zoovfuhby zosgoamiz zotdjldxdp zoupfhkunk zouwtzxjbo zowiynrcn zowkrpszma zowmmbdyok zowtzrshwj zoxelpgkjx zoxgoredfv zoxnuvxvaqq zozwtxixuf zp aatrzgpk zpbnvzfqcr zpcfncxjla zpdblzyzpx zpddvxcebx zpdetjbwh zpfsdabxnm zpglluqbcn zpkqoaabx zpljdhkzjc zpmcvstsfu zppmxaihrr zpobsswkot zppbsjgmjz zpqmqbixlv zprizzsqvo zpveahgdco zp wmmnjhe zpxwnspsxm zpyapyhyxo zpzaczufsx zpzlirartx zpzvcqtkyp zqbmxdzfec zqdaflhjgz zqdewyqudl zqdfzbsnht zqdmafimn zqdwoehipj zqeaceeaij zqicrotczk zqjohqxvdv zqkexhusfz zqkielcnsy zq lkkiokcg zqmdlxvdxk zqndremtaq zqnmfuzioc zqpvcaetaq zqpwltsuvv zqqvknimgk zqrjguqhuv zqtdfdphkd zqupswobwe zqzdagwgou zqzgldrvea zraujndcrs zrbsfimyjo zrdcoebnzg zrdzbmbfdz zrezhzhkbf zr gnjkgflf zrlqowtrzk zrlrzmqebf zrluqdhles zrmavmedxi zrmhnvmomm zrnuiukuas zrnyycgnig zrrrcpaks zrrvdrpohv zrsuoxhidb zruhcipqsq zruribalxq zrvuippcfm zrvxdlpbst zrwsjclae zryaofqiry zr ybkhsvvvp zryitlwus zrzarywrlw zsavejjksy zsbaujcgn zscblcjspm zsddebxpmc zseijqodcq zsenhkwiej zsfzzkljug zshobpvoiu zsjncpxto zskrgcwnid zsltueczvo zsnxjzgugo zsoqqiglfs zsqocquvfb zs rdrxjupd zsrurpztt zsryisoaft zssryxdhcu zsuaptnzee zswtigwydr zsxbdbkeo zsxmcnoqlm zsxpihnlsq zszebizivj zszkgqjvta zszlwdgcy zszpbpcadw zszsmsqjsk ztanvxlqpi ztdtmcakmp ztfrolqopz zt fweftmhi ztxfbkowmd zthpbhqxst ztiyঃspkvku ztjncnprhh ztkinmysly ztklfksprq ztkpkkiuso ztlflbzcyk zltgjtnpb ztnubomsya ztnuwrawqa ztojqkyhdx ztorofuxdz ztpbszuwi ztpcfshyxz ztprexulqz zt puiddsta ztqogpcokf ztrjztuhbj ztrqwxohe ztrzmdzjiz ztsetzbigg ztsewcrwia ztsezytom ztshufrrpy ztsowkrfdz zttgsujdb ztxdqztl ztzlrbrymr zuaayvtuuk ziacbtyczl zuaewwtbee zualxqejhq zu bltfpeik zucxoudxmj zudlmvfocd zueaubkljb zuelfypjcs zuenmoukmd zuijxdtworo zukkvzjizv zulbdwbuvt zulwkjgsfp zunfdhherm zunntjghlr zuphellfha zupiaoeuua zupwryzxfp zuqkretpou zuqnksjais zu rayezoqd zutfdhurtk zuttqnucfh zuvmmmyqrvg zuvtihsys zuwlbykzd zuxlggcqvg zuxtdvxchf zuyrkhiize zuyywawtan zuzbqyrurd zvabafhvgx zvccacfpmi zvdgqvflwj zvdhmdtpb zvduoitqzp zveaatjjiy zv fldcpwkt zvhruxcmpl zvhyakgbxr zvinijxehn zvinxsmsfg zvjstwehzs zvjqzbdfevm zvkfwaennl zvkokkqnnud zvlxgmlwxf zvmbqbszkn zvnajqitjn zvnkldqvz zvogarjeby zvomocilwk zvqeguojb zvqibcknn zv ruidxpto zvsxfmfhne zvukoykpue zvvkmojmcf zvvqixaahm zvyaelfzkv zwacxdbtwf zwapvndqg zwbmgorond zwbhyhndqlb zwidbdkkb zwigwmskew zwiskkrjtz zwnknohzlk zw kskymbnu zwlhafsesg zwlkleqiry zwlnjgesyp zwnbvrckcu zwojzsellt zwpdzowgmj zwrezedsec zwtgwpmwrg zwtojggirb zwtrwblxcm zwukybtnts zvzxniyvw zw whsvlbjw zwnnrydcxy zwwormgpyl zwwvrpitlq zxqjueyof zwycelpzxp zwzqgtuobe zxabmfwnod zxcmdqrfud zcrkwgwm srechewx zxtftotpjga zxtfturfps zxuioaxydd zxupsqdpqo zxxgadtqpg zxzeyexuo zxzjymsqpx zxzqkotjz zyajiffdcp zyauugszqa zyawmfqnty zyerlcamlh zyfgczhnds zygomcutwg zyhwddixmt zyjbptotez zy jfbrsrsqw zyjkdtnhzk zylisqqtq zymuedjrni zypqplsdye zyqkisjyzs zyqqztucz zyedczayy zytigfgani zyvagiravf zywteepfyd zywwfkcjmp zyycdkakmy zyyktgfhws zyylcqyafw zyrrpiwiq zyyyyaeglt zy zljmpmifh zzawowisrr zzbositibiv zzcznihilqbr zzdedeawnz zzeucvcmi zzedwyqzqc zzhuesklo zzhufjvkvo zziriouur zzjghccxmc zzjhkrrzn zzjkysdkmu zzjcbgpn zzkcbzzcq zkhiaigfx zzmndzkda zz oxskxdcb zzqtxtnpqj zztbxwmtg zztfaceixj zztvdxbefw zztzovvish zzuhtpsfu zzwusgtviy
Execution time : 7274 ms

내가 만든 힙 정렬 - 번호 정렬

098339935 01098340803 01098342220 01098347903 01098349213 01098350845 01098360387 01098364298 01098365356 01098368694 01098369695 01098395310 01098397964 01098399531 01098401044 010984041
01098407824 01098408773 01098413845 01098415948 01098417480 01098420275 01098423714 01098426203 01098428669 01098429347 01098429446 01098434978 01098439217 01098439416 01098455731 01098459640 01098462714 01098470350 01098472837 01098476151 01098481011 01098481657 01098486359 01098488767 01098491196 01098491333 01098505755 01098508692 01098509276 01098513198 01098513947
01098518913 01098521092 01098522643 01098523379 01098532197 01098532924 01098550112 01098551707 01098560732 01098561636 01098562955 01098563793 01098565373 01098568931 01098568971 01098570905 01098571701 01098576645 01098588325 01098590613 01098592815 01098595237 01098595990 01098599244 01098604089 01098609099 01098609638 01098614922 01098615533 01098618356 01098619697 01098627882 01098628292 01098631411 01098632164 01098635379 01098636429 01098636791 01098638011 01098645745 01098650370 01098651697 01098659318 01098662613 01098664667 01098670498 010986743 01098682292 01098695606 01098705509 01098706680 01098711630 01098712715 01098713525 01098721709 01098726086 01098737416 01098743104 01098744062 01098752610 01098756452 01098758240 01098760768 01098761739 01098780133 01098790551 01098793447 01098793551 01098802367 01098803139 01098806808 01098808529 01098817703 01098821047 01098822548 01098837498 01098845355 0109884961
01098856642 01098865603 01098872139 01098878781 01098879828 01098880365 01098880579 01098881068 01098883725 01098884020 01098885806 01098904525 01098905924 01098911047 01098911204 01098914470 01098918543 01098926377 01098933211 01098934538 01098934619 01098939205 01098939276 01098947009 01098949129 01098951182 01098954310 01098965861 01098985680 01098986163 01098994866
01099003611 01099016248 01099030024 01099035486 01099041348 01099073348 01099077089 01099092995 01099094913 01099102226 01099105926 01099115729 01099119620 01099124355 01099130693 01099136665 01099146037 01099146127 01099146322 01099149824 01099150369 01099152408 01099152662 01099152676 01099175619 01099176324 01099182060 01099185612 01099186764 01099190404 01099191988 01099194647 01099197313 01099215926 01099229600 01099230410 01099236789 01099243347 01099263048 01099266628 01099270231 01099271677 01099286639 01099289007 01099296389 01099304677 010993155
01099320298 01099325531 01099343410 01099353557 01099372075 01099372168 01099372842 01099384638 01099386803 01099391160 01099394487 01099409585 01099412658 01099413797 01099418800 01099419995 01099421188 01099431348 01099435272 01099441688 01099444133 01099455466 01099465631 01099467023 01099472244 01099481205 01099481281 01099485967 01099487454 01099492313 01099492841
01099503078 01099504643 01099526629 01099527142 01099532066 01099539521 01099545325 01099546595 01099548276 01099563262 01099573271 01099574395 01099576315 01099577113 01099580109 01099580920 01099583235 01099606697 01099607947 01099609235 01099614485 01099614641 01099615776 01099621098 01099623795 01099626379 01099640237 01099643145 01099646610 01099649965 01099662841
01099665220 01099676757 01099677831 01099678955 01099687203 01099690507 01099694136 01099696870 01099702127 01099707928 01099714405 01099718402 01099720822 01099723815 01099726006 01099732665 01099741800 01099745141 01099747415 01099753279 01099757063 01099759144 01099769988 01099770574 01099779387 01099779723 01099782436 01099789207 01099793716 01099794895 01099802329 01099811955 01099821048 01099838439 01099842296 01099851783 01099866928 01099867355 01099867509 01099874151 01099882068 01099891322 01099900740 01099906965 01099908756 01099910392 0109991524
01099915524 01099919936 01099928591 01099929305 01099930269 01099936812 01099937956 01099941828 01099951339 01099955625 01099960201 01099963694 01099964142 01099967273 01099967783 01099972016 01099974194 01099974469 01099976158 01099982825 01099994568 01099998513

Execution time : 7705 ms

내가 만든 정렬 알고리즘

- 앞서 살펴본 결과들을 통해 정렬이 잘 되었다는 것을 확인 할 수 있다.

전체 알고리즘 실행 시간 비교

```
qsort, id array :    3224, quicksort id array:    7642
qsort, name array :  2513, quicksort name array:  8385
qsort, number array : 3180, quicksort number array: 8609
quicksort id array:    7642, selection sort id array:    1220795, heap sort id array:    6990
quicksort name array:  8385, selection sort name array:  518257, heap sort name array:  7343
quicksort number array: 8609, selection sort number array: 1046015, heap sort number array: 7705
```

- 먼저 내장함수 `qsort`와 내가 짠 `quicksort`를 비교하면 내장함수가 내가 짠 것 보다 두배 이상 빠르다는 것을 확인 할 수 있다.
- 내가 생각한 그 이유는 내가 짠 `quicksort`는 재귀함수를 사용했기 때문에 시간이 좀 더 많이 걸렸을 것이다.
- 또한 재귀를 좀더 적게 돌 수 있는 예외처리를 해주었다면 더 빠르게 정렬할 수 있었을 것이다.

전체 알고리즘 실행 시간 비교

```
qsort, id array :    3224, quicksort id array:    7642
qsort, name array :  2513, quicksort name array:  8385
qsort, number array : 3180, quicksort number array: 8609
quicksort id array:    7642, selection sort id array:    1220795, heap sort id array:    6990
quicksort name array:  8385, selection sort name array:  518257, heap sort name array:  7343
quicksort number array: 8609, selection sort number array: 1046015, heap sort number array: 7705
```

- 내가 잔 3가지의 정렬 알고리즘을 살펴보면 예상대로 선택 정렬이 가장 오래걸리고 힙정렬과 쿠적정렬이 더 빠르다는 것을 알 수 있다.
- 힙정렬과 쿠적정렬은 시간차가 그리 크지는 않았다.