

Sean Hinchee  
Nicholas Losby  
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## Lab 4

### Experiment 1

A two-round solution was used, one preparation round and the partition and sort round.

**usage:** `hadoop jar Lab4Exp1.jar exp1.Lab4Exp1`

#### Partition 0

0000PD9thXhXofi 0000PD9thXhXofi chun0MZImM5N9UrMKCqggocrhEDX2Nqm6iTpsR4A  
0000TGabjLm2YOU 0000TGabjLm2YOU IU8KDXmPn6z1CY1Gjmoi2VzsKrRE1b9s7nA1ZhCB  
0000fkuE2hrDZsr 0000fkuE2hrDZsr c5rySnBIAFAi6np83GNYu9j6UHOeBBy1UJ4KAtQQ  
0000kbCSxbEOcJ6 0000kbCSxbEOcJ6 qJzh1CyhvhCnKmH839CaSJn3snrOF62UAuRVPWPE  
0000p0psH4tAXvp 0000p0psH4tAXvp XNFIJMZ2hKUtUFI6KJngzCAsSxnqDmLfEkb1T6Ag  
0000tOtxf2mp6z5 0000tOtxf2mp6z5 iPJ7ig83a91XYd3gT1SgWkTDg6hodfVlssgtOhyc  
00019jGRZIH82C 00019jGRZIH82C mITRORt5PGYSB0TzHk6HP8G6n1heT8IzVOAvqFqQ  
0001iNvTEyAu70V 0001iNvTEyAu70V Jpo0OKxivTp6YA7K10H6RjpT0DgkZq6zepFBI3Jx  
0001j8fsrRh1HTK 0001j8fsrRh1HTK IdBrJgDOVcRk887AH3sT6RocsCGZ4c3pfnl4bVLT  
00026M0neXejSHe 00026M0neXejSHe 3QQ64K4gFPSntDvNZvPhjqO2xFgtLSUT7AV2j9s3

...

luVhL4o8MzO3ZYm luVhL4o8MzO3ZYm  
ipWWaaLRCNVNNnvPLTD0r7kOOd7X6uK13CKimhng  
luVhTjNyK8a77OE luVhTjNyK8a77OE uWMMNa7BNFKfRmLhaBjBEgVszblvon5JqKczcOd8  
luVhVTG9npC02LW luVhVTG9npC02LW  
sg6KC8W11VBTxNcsX4A8PG12MeWcmktnOJeR6LIG  
luVhcBOKVOgS80v luVhcBOKVOgS80v mf2D8NrLD4ycbTvokykMVMehkUhOV0hr58g8Zsjt  
luViXAcpcrA7DpC luViXAcpcrA7DpC iV5QInAPkVvPnl3vEyMdRicPi4DXax2frZ0XFcZo  
luViopvVPoiBdJO luViopvVPoiBdJO zzpUp94qHYo4xoXhSEGfaNjgaBeg7JGtdd34qLWa  
luVj5rbcnZuzobV luVj5rbcnZuzobV or8f421Rib82xbSOVOMLtGT6bsohDCqSjZpzkyab  
luVjPcxJUPuaKpY luVjPcxJUPuaKpY 2fxyJWhU4QpumMvnadsrvXXzjeCJjKqemW4RNo9Q  
luVkh9D9TTJPSC2 luVkh9D9TTJPSC2 rr3gzDif6TjI4q80kQoyAXmxp4Fgu9zXOaB4Bv6h  
luVkekouFIXWRjd luVkekouFIXWRjd RcPJmtNBzJpjDzect5b8HxRclFKjWpbO7ImoRFD5

#### Partition 1

luVIKnKUcJiLFiN luVIKnKUcJiLFiN bVXN3PyO6Ckmc4CyQQx7ruqyU4Qx2gXYKyulHWRr  
luVITjLhL0kikiT luVITjLhL0kikiT rO3SoieAgM6N5SzI0K0YQ9nbbJ6Iza89PlqZOY6o  
luVlh2QPEIMk0Tx luVlh2QPEIMk0Tx OZTY9IYOBNpHFc1zR5IDFr133htPUIGb8a24n9hv  
luVmBVKNuWt4JS1 luVmBVKNuWt4JS1 n9hEY2oRtTPLAfkKiX7diAiiHZYqOHmOyypubusR

luVmdz3ce9A6De2 luVmdz3ce9A6De2 ganJUpcfect6cc5H9HiEYP2K5MxmEeHCe0BeuqVk  
luVn3co3bNOQYv6 luVn3co3bNOQYv6 jeuqraibISG6T7cvpGdAdVhJSZRvaB0C95eXhhiL  
luVn7fcYIntoyYV luVn7fcYIntoyYV ijreTEiaCnjHtJmSx5uNIRnOSO3H25j4jS8tM1My  
luVoMOqloAdSram luVoMOqloAdSram X8LL47QlgHY47qcUVniLtWSMyfQa0k9itgiRXTZ9  
luVobziJHaqs1PT luVobziJHaqs1PT 7X7dVIPTLYIUt40fquPluDBJ21ZTx3YEQoTFfHBZ  
luVodJh87rNGDRP luVodJh87rNGDRP zI8OIYmL3zP8MScx8kFutXBqc7mJuFRvsk3tRdMi  
...  
OnIQDNBLcGgtzjE OnIQDNBLcGgtzjE 3ikmNQX2BJTpAe15zn7aGE5WWJX5gdCuno27v7cO  
OnIREIPSZZNT9ac OnIREIPSZZNT9ac VaA83rFNS71da8143ttZhedS8qvyoA2Ppd77ulrv  
OnIRluCIHRy4Wlg OnIRluCIHRy4Wlg lppF47YyZAHJSRT9mDbDBDXW2E8YYIFY7d3WSh0q  
OnIRTQIT9XhSSFA OnIRTQIT9XhSSFA UdFKC5pruimtAXTInj6BHAHBDI9rgECUyIV52vj4  
OnISBuMESpceVU3 OnISBuMESpceVU3  
SOVSqcWGOu8G6KOSHObGbcHUnn1oAcLtuiAIOJ5L  
OnISJRzOAHqIhO0 OnISJRzOAHqIhO0 oolmaU7zxOd9UsHIIH3E00khq7Ag4apHZqFVQ6JC  
OnISTGOrv1N0IZn OnISTGOrv1N0IZn F5gbjTyCkEP7j9ZrEEk1vQjiVGmP9NchLFsRkZkN  
OnISUU1diSoE3CX OnISUU1diSoE3CX ZXeZV78BeNFYeNFv6bUWIE2P3j8MU7IbDFoVnVCg  
OnISoTJbvfheYLM OnISoTJbvfheYLM 17ZFmgPQ657HSngGW38biCqDpYGnbSChQGfdR33a  
OnISxTzt1EpF9h OnISxTzt1EpF9h C9q0mRHKoLpvdrF39j8bcYsZr9IRR98NhSBdJ2qf

## Partition 2

OnIT3bct4vyxhHm OnIT3bct4vyxhHm 1SCVKf71oa7CTJVUgx1Tlp2S0NB706hWTmVL0ySe  
OnITNH8ybYK6X10 OnITNH8ybYK6X10 Blx71qb7nWd7Tf6QKbkZGYKygL7zMf5et7JXRWba  
OnITOIrE7ydoDT4 OnITOIrE7ydoDT4 DFEFEAAab1CP38fhjNV5rAK26AWGJY9i9lpQCpN2P  
OnITa4su6nIlimj OnITa4su6nIlimj 6isMjiWclW1zAB5DCde7nhQlj9RKBA2oY85JaN7L  
OnIU0njKFCeTj4i OnIU0njKFCeTj4i t56kfVBtznYzNcP8PoFhl6nNW8FQKbGPK6bTrdmJ  
OnIUByf3UQqDbsl OnIUByf3UQqDbsl zz6VVUaX2RnamEclsOzTsm1sXbgHl8L5cgPljOIY  
OnIUeipjcBoEuz9 OnIUeipjcBoEuz9 NjMPWFcfboBJo5C1JbFKpJbBr4IIIztlzvGHgqyL  
OnIV9D80ILX8xDb OnIV9D80ILX8xDb EJ2hZDtKicrlzO6fvRC298SVTIFv0PtfIRiJ2auE  
OnIVDz5PxYQIGLm OnIVDz5PxYQIGLm YzlpjJyWvog9PjKA2nZLF7vZMtx23W6nb2HgQLJX  
OnIWQSLIRQ5tdmy OnIWQSLIRQ5tdmy XIntgzMua3rV8YaNnl4B05RxxB56bvRSasX9Qvfk  
...  
VuRj2Q5ARkXJ9sJ VuRj2Q5ARkXJ9sJ  
TS444HXTG7C9M56NgtcAWegKBeK8WNCrbZDM3LpA  
VuRj7psXopbAyLI VuRj7psXopbAyLI UeJAmV5kUH3uhSJvd7cB7dFnGNTiME0JZC5dZpjW  
VuRjl8jro2180fU VuRjl8jro2180fU 1ZShWrTZk3JWQJ9tDNhBuH2mpSA2Pmj5b4iLRsZX  
VuRjlhbPB5fXOEG VuRjlhbPB5fXOEG lupe2yQ9F9ST6AUZsGD2yR8AOh9kkhkFLxS9j2e  
VuRjrbh7YRSIHq1 VuRjrbh7YRSIHq1 K2kire0Q8FhGW6oFWatbskJmP3KQaa3zZghhRHub  
VuRkQGY3MByEg8E VuRkQGY3MByEg8E  
vIW9Fj3BbjznGnGpxyDXztHXXYzdbMMFkFkLLAhL  
VuRkXvcyeXGW9V8 VuRkXvcyeXGW9V8  
P3JSFRePIKF0GvoSqaSUs1GIMFnMEm1S7J3OoDOE  
VuRkfJvTMdQU5IK VuRkfJvTMdQU5IK 0FWsgptpUzDuZurKb5hNd4yJ0FO4b264tOpzgl2Z

VuRkfiP9SSx1NDW VuRkfiP9SSx1NDW 25mlOmT67gjMbZxHvWyBNdmZFJFq69743d1IKDDt  
VuRkgndJfPhxMfX VuRkgndJfPhxMfX IzGVHLkWgheoSkgYzKrhJEjaPIFKMnl7O7TPXBWv

### Partition 3

VuRIREI15XGIL0i VuRIREI15XGIL0i MoP2CNraLoFsyRDclTZsN7NJxxYKB8mvKhv5GgJg  
VuRlxhyl0a6ALPF VuRlxhyl0a6ALPF suOJFP3L9c1YfQe49PfrlEXtGYXAGATHqG5vrWNU  
VuRmiq0FJSPdUZU VuRmiq0FJSPdUZU MxTeCefel3dMJy5Eb9luxJ5OxAO3SDepxYNAQkog  
VuRmk24xqp2V0hf VuRmk24xqp2V0hf suJFuzDTkoGcPKpun4Wc0hAf4dVE4Oy3sXgOrRFH  
VuRmnF3bF1AryHV VuRmnF3bF1AryHV XUxRMpkULIAZSsa2tz8P46gcjaq17chyrPQxmv6J  
VuRmq5Xmgd6SmJL VuRmq5Xmgd6SmJL 2jhaXtsky7LIJCo7tHSi4DZ2V4lmVQV6Ar0kEOIN  
VuRnHf0rQCHzzvx VuRnHf0rQCHzzvx fxH5mrPHL3nsm2gJqSMu1c18SxocDZdUMXirnE2b  
VuRoGnoTIKMf1hV VuRoGnoTIKMf1hV oYXTj8s8gKsuWopn4bJtD5zQD3qYEPE86Yyr2jVK  
VuRoQkbUV7PGkaH VuRoQkbUV7PGkaH  
FUHF16JRMV7b1zZCcZGdf2ojXURtCgUctVvYn6bL  
VuRox5S0ZIUnM6b VuRox5S0ZIUnM6b DWYy4iVgxleTancFiJDspMmpaMhVMYKt1dgUMXFd

...

gp8z8YBxNAzJUFx gp8z8YBxNAzJUFx SdmbfnymyUu8NLd9PXjbq5K9NXdd7qhSLEYj4fvG  
gp8zlgHaj8B7cZY gp8zlgHaj8B7cZY cVRXUbKfb3HVFWH0OKMALpGyVanKjz5oJtdsaGRm  
gp8zPuobzDVcnit gp8zPuobzDVcnit mG58GtYWvs2qXBn361ErxzkMmenKijtAqlfbH09Z  
gp8zkkAYB4WvaXn gp8zkkAYB4WvaXn IOyZcOifmZFq5qn2vure8iBa0mofql8XdaYKS5c  
gp8zqvDJDJljsZg gp8zqvDJDJljsZg YRO0f6x3nyBmaLPS8O4oXYtUySuOcalM57O4ItLF  
gp90FIVuVyWYpYI gp90FIVuVyWYpYI fPuu1ExmnUr6pcxsCefJQ1c3kAN8dh149GxoiViH  
gp90GMWnBoZbubh gp90GMWnBoZbubh iVfiOcls2v4juB98GeLQj3m5YrXaqbN2VMolzrKV  
gp90l5V5xF56IPj gp90l5V5xF56IPj 5dSfQAZuGAbxYKfrqJuuUUY6YvDE4UIHjufhG4Q7  
gp91ZQNEGtGqKxn gp91ZQNEGtGqKxn  
2BM1G28eNYeZA18U3lHYzyDdToRxH8bUJ3jOLAfO  
gp91aafuv80hmbE gp91aafuv80hmbE t0vOGUj4QkMXcd9W49HNtmygTBz7fAlfuX17jIH6

### Partition 4

gp91ne3c7PLnPSv gp91ne3c7PLnPSv 1aTO3bhLNEYjVeyG5obUjJhoD6dnel0tU54difDu  
gp91pmKsc81LMBc gp91pmKsc81LMBc tx2qikKvN9ADqK9ssH0m5TS0qiEtmrsu4hbnlz0e  
gp91rx6YlcOFBkW gp91rx6YlcOFBkW t6iVGYosWJo956FDQA6mSDttSUgTnNNpkoR1KFKE  
gp92eGjYugCajJH gp92eGjYugCajJH JyOENtnv01mRQtTqjt7prNH50ijY6VfJWA0VtCGA  
gp92id8vpFFtxND gp92id8vpFFtxND EPmEoTvqF4QXI09X726NRAHTMgfhG1z3ZpFopmmv  
gp93LCbPHbdkWO3 gp93LCbPHbdkWO3 QAR30jdHi4KLiOW0rjzYcqllPuKUsqpHDe1FVtK  
gp93aLcoRqJkZKu gp93aLcoRqJkZKu srUQD20KY0UMIn8JrVqjjm7dtl8uMSpngZg8QXq0  
gp93f9r5JHlvau7 gp93f9r5JHlvau7 bhK8s6IDqabmjD7xQbaIVkaoDSthEDN7xpiR4Mn  
gp94DS3eeaOXkkP gp94DS3eeaOXkkP  
p6kLaU1BfHvpOGX9XWHyD5GQ2loNVRfaLUMBLMe  
gp94vXm322RM0ix gp94vXm322RM0ix 3rKrY0UfzB0ohWBZVI2JanoQao2klVGNTyTW3hAE

...

hgqr1PbyPgmZETB hgqr1PbyPgmZETB Uhy7MJVprc82WDD0CVTd0Q245KIMAKc0yy2hela3

hgqrUfmqFmHOR17 hgqrUfmqFmHOR17 pdER6qWQfBZ6YXxiyZkc6UYhUTIQL2iz8DPuOy4R  
hgqrXDp5GevN9HO hgqrXDp5GevN9HO  
eMNYGGncn2obePLFQmxod71Pv3G8xAmvZOKVLd1d  
hgqrueOFn0021H hgqrueOFn0021H NZb1z82m3i7Up2ZaqcfRn87SBjjaqeGgJBLsviB  
hgqrxiP0VzxOh7O hgqrxiP0VzxOh7O KoCZzRnyZ0Phn8s775Tsqa0lkyV8zFsKpXHTfT3  
hgqsF4gcjjBIBGL hgqsF4gcjjBIBGL GOFILWxt5xyD80YOn0HLL3XeHCHpA0cJYozEt7Fn  
hgqsMvJxZ3y8uxQ hgqsMvJxZ3y8uxQ X9umsfvhtHcMmSkPKRkiWMyNrBH91voioWWmuVd0  
hgqshhblz5al2We hgqshhblz5al2We UNRpCCCsgcdAvWQ8epWQZhAX6Ou8g6mmAmykeusm  
hgqsmn18fWD9lj2 hgqsmn18fWD9lj2 mbo9Gus4dzzqFXViBxat2jirMqvjX8JP5K2sGUYV  
hgqtXEelOjVgv5l hgqtXEelOjVgv5l 70MjG509F41Eijq0b2dbpjShgFx4ikUu4R3lCzpZ

## Partition 5

hgqtitOvLcMrMvu hgqtitOvLcMrMvu NLxO3SC80W4h1RolcNuct3hCKsrF9lli4faY6nXa  
hgqtraorTNZFRYa hgqtraorTNZFRYa 5djlJ3vVqo84satX3PCzGvX1xFlczbCufSblYRGJ  
hgqu3BIMpmGo2jF hgqu3BIMpmGo2jF ZhUIMxbFTUPmrxhvRCU7G1lqFTQa7QqVyi90MS1S  
hgquNMyxLMdXLTB hgquNMyxLMdXLTB 31aseea05Kkp7KQsizDz8nYusALRMGI33HU39xqy  
hgquVyyq52JHAsOv hgquVyyq52JHAsOv 3Y7sdYj6EVLZjHD2RDIKXYi5iOBFisil5pvFH5VX  
hgquXtalycKsuAZ hgquXtalycKsuAZ rs30ynfxlPvra7OzRtTM2HpsfAreVEcP3UbKQOOp  
hgquinzO41xs2T9 hgquinzO41xs2T9 xVUFMjrlAuNrFgAsbEjcAS6ntx1r0vDo5ivqhz6t  
hgquqjExb5iJ7k2 hgquqjExb5iJ7k2 rp928B8fObLOQCjdTuRoRezIQsa1oc0N535iaSD0  
hgqvTqTdCbnvDZI hgqvTqTdCbnvDZI 58aFnkh7Ax57WvtxNANPQgcAKffpqXkLCDCW7sIX  
hgqvukXed32tIs3 hgqvukXed32tIs3 tiMfSAkioW8jE4YBXQ39x0ib4AYJAJAA27OZTpgR

...

mmg8390A4PNfqCy mmg8390A4PNfqCy nTcXHma3VvpY4B9rSUcE4yr86VEn500JXylpVzJU  
mmg8f0t0GX00M8v mmg8f0t0GX00M8v he7en5tfjAsSzTyJVuj5SvKBr2IV3Y4uBg4eP9zL  
mmg8tRcrPhLAQnl mmg8tRcrPhLAQnl JzXp2Gh8yKnf5ADk5gSQuCkOhU8xc3y4JxqEuhaF  
mmg9SlrcdsHWDVL mmg9SlrcdsHWDVL  
pbkSrKz6TMvnR4LWPzRVqt35CTdbO4VzhxnTsWkJ  
mmg9Zju7pm4HhT4 mmg9Zju7pm4HhT4 CksBkWish5Bv2GjmTcCLbe369QeDf0C6ay1l20e9  
mmg9cNgo0AzW9ry mmg9cNgo0AzW9ry  
yJT3xQ8gMlauVNUU1EE91cKboK3D16TTWmNeB4yQ  
mmgAaUErK7iK4y4 mmgAaUErK7iK4y4 5ay4lbo0gnMac3kTINYKbNEK8SFUnnbMXk5o0rr4  
mmgBR3jx8O3yfCJ mmgBR3jx8O3yfCJ Kldl9KhFQVbKpMQttl8Rodvu1qu0ctNEPb7WkEUS  
mmgBl4b4EKtElNB mmgBl4b4EKtElNB 3sSdGmYJ1YmXfszPRsB240l0pCFfmyYatlQtFar9  
mmgC5dU8pq8XPIJ mmgC5dU8pq8XPIJ 8jdN9Obifc3asgxZrel9x7M0ZcDEJjGk08rr9c15

## Partition 6

mmgC6lhrVM7Pe4r mmgC6lhrVM7Pe4r BK3GTHkFtGk2px9zsMPUQKTu06szRdD5Almp1Wyyv  
mmgCN8n8R39bMci mmgCN8n8R39bMci  
4kd00xaeWvvoD9buNNTBRfDI9vgms2HzOmNqBPvS  
mmgCb9QzAoglhOj mmgCb9QzAoglhOj 4sPRbPY8PT0gKACGDOF6zCeYXarTy62jY1KutiiO

mmgCIAnbgdmXRmS mmgCIAnbgdmXRmS  
e0ECjy9tNKs5GsCb8Xie1h6mLWp6xua4mpy6Hi6n  
mmgDBDEiCCebmfM mmgDBDEiCCebmfM VYCQx0KiCUPzYt1ufnQrlfag7y4iMH6cbQISOT91  
mmgDPzWspiQz685 mmgDPzWspiQz685 tfaImYEpJzleoqD1gEZItxYScqDTVBik3XReUmFv  
mmgDSLGYdQvjKzD mmgDSLGYdQvjKzD  
HSyJn5cNVZm9dEikLC829r8Ah2CxG3nMYN7vBq3o  
mmgDSQtIj080mN0 mmgDSQtIj080mN0 qymiXpO8Jjv6O46IP3pU2cC1G77Tb7O4UtpN359U  
mmgEAvf6kpjeU9R mmgEAvf6kpjeU9R IOZcSIIIU5UobX2tamaDvOseTndcRBhXDNgk3J1v  
mmgEBa2vqrWyN4q mmgEBa2vqrWyN4q LomHgBat2akT9a8iF1rL91DGnsETEG5ipJ6yzXK6

...

t6sR6xBoWOInxxT t6sR6xBoWOInxxT cAjSRlkcGSGTZil2EsoeUa2qVZozGETmi09ryY3K  
t6sRCNMOakPBrR3 t6sRCNMOakPBrR3 QKJOWTqpHjmZcvGbdG3AynlTi8qqcGHZFbGQXqri  
t6sRNKMQOKcFzSQ t6sRNKMQOKcFzSQ ioiEECu35M2VN2gXcbao9olHhXecen7ArsjPgLRZ  
t6sRPWI2RH1tYKo t6sRPWI2RH1tYKo Z6cTWpTnNN88m1J6cX0rTLNK46rW0BsTLqX78usC  
t6sRcgqrWSGLoCy t6sRcgqrWSGLoCy XJ0xSbF8F0LrrleblAUmTKGEky3GigWIF2pqDkRo  
t6sRsftelZ3arXi t6sRsftelZ3arXi bZCZQOBxre79258mybnUT4z9AFUBMiuogGyVBv5V  
t6sRts0eRN7drtD t6sRts0eRN7drtD 2793OEojDiMxoCZpnKeJ557KEtG9B2o8sDxoHV77  
t6sS7FmE1MKBI90 t6sS7FmE1MKBI90 Lzl0n7yQe71rNnO9sWK18LBInP5uTpzMjsLiQjdU  
t6sS8oPSasZQoo3 t6sS8oPSasZQoo3 uB3oI0Sen23EzL6HOCrbAGrtFsgMCmMNAWkuShsp  
t6sSC4calryUyS0 t6sSC4calryUyS0 z4kmY06jyjoR8m1D7PboHQnehSaJ3xjzZliYp5WY

## Partition 7

t6sSDcHrSuqxkOW t6sSDcHrSuqxkOW DTQgfAha6Lqgdh4Ubfzhb0lvoFJulFc1Z3Gf85WM  
t6sSeKgssrOditC t6sSeKgssrOditC kPtco3IFx8B4AhicEDKBYB0M0ZqHJsPMB7GiTXTr  
t6sSeodrZnyyVYr t6sSeodrZnyyVYr z3qLFQcL439lqNpHd6NTKKjh75RFI08Qa1N3OZHb  
t6sT3lJivzQrSyC t6sT3lJivzQrSyC EFz4OjbBsZ2kXP1kyoiNoTCcqajTbBNK92RohUMT  
t6sT9q8AJ1oSgkK t6sT9q8AJ1oSgkK gbhDAgUHYqzrKZEkk1QruR4gCB6KMYhjJdotiDI  
t6sTBVG5vZmEMNo t6sTBVG5vZmEMNo j9MZINaNa97iNYE0d4HEbR477IRvcaoqIVB9JN7C3  
t6sTJKWB6ePvFGk t6sTJKWB6ePvFGk tm8Lplleyx2rNsjiEv9UiByBX0MIPuDH5uQpmltS  
t6sTUrihgY6VoTm t6sTUrihgY6VoTm CeHREgjRGpqnfeTelf1xIPloEKf3AgQlpyaKxubm  
t6sUDRPRVXt2hNa t6sUDRPRVXt2hNa kjjQD8r5p6JOeGeualUcSmsB3rq8dKqfjRIHDvEu  
t6sUL1RgCd1Y3j8 t6sUL1RgCd1Y3j8 qHXBzIX93sCyO9p9Sc6ppFxoA8igEX7BEfZBa4X

...

yVOqdAPojlCOmEq yVOqdAPojlCOmEq Nh2E5IP4txqPpEu38QDJcb2TzoeR08tU3goGXEOO  
yVOqqCdcO3Byrtr yVOqqCdcO3Byrtr 7hYeJBLtjYzFh21sGSSVgxZ8nGAVUgcfEg04QeJr  
yVOqxad3GTpmqGg yVOqxad3GTpmqGg  
vxL9GCFOgonL3uD4HmPO3qyck1zeXpufFMeBkAkL  
yVOrPEU9bGPYxrK yVOrPEU9bGPYxrK AjpkUkZdn2nptsIh5xMLzO5shiS20kl5FqfPG9xQ  
yVOsTdOyOWjZlah yVOsTdOyOWjZlah lqnhim2fBjlp2enPjyVSRlpYCHampCC9N7fNPkRG  
yVOsiyRfLKzcrXi yVOsiyRfLKzcrXi 6pzlujX1iBPZMLCoKqrjFzOU9nOff06qyGXfcF1k  
yVOsYlRtcE6C46F yVOsYlRtcE6C46F PE8dbTVc1EBXpjOMfbAQTn48G6hPdchCviMBBrQg  
yVOtFrzKda5q81E yVOtFrzKda5q81E CH7yBDf9H3BMtPlxHXLEtc2KhmsHn2oOs2k16bQQ

yVOtWJ0tDVm8nOY yVOtWJ0tDVm8nOY  
pLQdgnRmSUCMvS9HGmdn5vHKJd85o5adSS2ydRyQ  
yVOuKa9V1CMhUX0 yVOuKa9V1CMhUX0  
xJmn66vQ4hVmaV1BULkQeoXqam6M6vFZtvkbfuJu

## Partition 8

yVOuMnkrBi2Tj8e yVOuMnkrBi2Tj8e IJ4hPV0AOtylB78GqLTAEaAeFLC5WmXQYYSuXrxy  
yVOuTUoUuXcjXx9 yVOuTUoUuXcjXx9 uj5Jcaf4zCRygeGbJPGia6QoAKVDk8Cx6vjqlDtg  
yVOufDmGXu28zln yVOufDmGXu28zln BIAgGz5YYScqKZ3xhGd7DIW3HZxhic3M3SaAygD  
yVOvW49DHQk6cxu yVOvW49DHQk6cxu  
hDp9UnGLg6kH4Ksm1bhhEmW2k33pFrUVAHglhgX1  
yVOvn3S0mflpGCT yVOvn3S0mflpGCT 3OZLHs1MSdSfii2Fabv9GW54R28xQBUsNZ2HuNzm  
yVOvt3piNIMU52m yVOvt3piNIMU52m foyCboaKhx9VoGttWnv6iHHR44Xz87hQMUpa6h7u  
yVOx00Q1Nhh8uql yVOx00Q1Nhh8uql zEFfpZ4bjpiEDSKChWGN9zATPublmm2OX787J  
yVOx054N4W5zPQR yVOx054N4W5zPQR fNA8kHjzSC2lpNvFxaclq9QB9k2lib51K2pZe3xP  
yVOxJNiVVK3fDHG yVOxJNiVVK3fDHG Zc7X4IkBlyW3sHxAsuNQYkjqYKnAyzVJ4QfqR9  
yVOxZ3Ocnjx92r3 yVOxZ3Ocnjx92r3 ZYUa1rH2R3O5Qu9hZQJAJ4fr1glpoXg14KcMJJ36

...

z9Z5oTtgznN0hAv z9Z5oTtgznN0hAv m756cQq4odIJCGbMjfJzV02uNeMRn8KzzXGCUYjO  
z9Z628Y11BzjbYP z9Z628Y11BzjbYP AbWGzBMRuJWCISAv7OEsbHZLHiA8W4phvHeRt6m3  
z9Z64NvU1FH5q69 z9Z64NvU1FH5q69 DVtnzgkzoafH0Qj7ilybL2QNb1yynRSp2Bv9ix7D  
z9Z6WFN6G1xZFP0 z9Z6WFN6G1xZFP0  
etUjv5qOONQqp5zYD9xxYX4QT6cGJZm6MDCTAubu  
z9Z6iBGigUX8Sur z9Z6iBGigUX8Sur 4CCxcsfzT9YvuGV1UuTcYYDq3mX73j6UZiMXEglk  
z9Z76uqH1j04f39 z9Z76uqH1j04f39 l8a0WAVDe4dS0yAOK4lBmOgsVWPCVXT5eJO7fOLF  
z9Z7G2Jc9sBJ5ii z9Z7G2Jc9sBJ5ii NO2STp4HR9M244geZxhpuLCUoalE4uS9Ai2Yv9j  
z9Z7lae7lil3PyO z9Z7lae7lil3PyO Sf84lvGgeKrJ9segCgWTOqV5g0ZBUP7J6ecqGa8A  
z9Z7bWfTnm6jZpY z9Z7bWfTnm6jZpY hfxZRLzHCiuzX4s0IAfiZNv61MqgCBGftokat1HV  
z9Z7iekMcnXoXPn z9Z7iekMcnXoXPn FJf1qcAbOZ2YEeXlmYqIWxO7uDpPI0DzRpDSC4bP

## Partition 9

z9Z8HUuTpQzA7ac z9Z8HUuTpQzA7ac Wy1iBRRKMJIOq5DufprloSTsd75LSP66a5dH3vNE  
z9Z8b1sPL1FWyZM z9Z8b1sPL1FWyZM ptN98JsS2grZWbsQABiIDSLXfYQldf9zu1rJJJab  
z9Z8sD46foEW2x z9Z8sD46foEW2x 3XdIHfc0UmxTnJOdUcUIUcfANxy8JCnzfcRZmc  
z9Z8uYe4tMgUeV8 z9Z8uYe4tMgUeV8 GoSSBKAZAF8ZOlxVWO3n3oXRgeQO9tN4szkBDfJd  
z9Z92fXkPBRT3kf z9Z92fXkPBRT3kf IWTdqpCJTykDPVsyvqVdYnTU0abktWni9YfSJL9X  
z9Z9DS6fBdTTXZI z9Z9DS6fBdTTXZI JcYyigEIh2i14vXhQQGO6TW445Se2D3hcR0BPK7  
z9Z9IJ9kTzqsCoY z9Z9IJ9kTzqsCoY oA3s1MkpFM70vn5krWNOgeixouMovDjd9kdDXGOA  
z9Z9NPEdZ505JTZ z9Z9NPEdZ505JTZ RMcbBFicvhLCPnjK9LqCl23bHUeoeTS93LqndNpC  
z9Z9V8HHkO8m5d2 z9Z9V8HHkO8m5d2 aXofNYZ6WtsFjMjS9snbulhXMBPzfs3EU3b9L5mT  
z9Z9coB3enUjA1r z9Z9coB3enUjA1r mpj6bfhA0WjEsa0gNzXvAmY3zNB2ZFga4VG9MQSK

...

zzzvlQoAEjnuOrk zzzvlQoAEjnuOrk Vjr3mpJlut5PtoP5Q9m5sZxDhztO5mqotdT5DnuA  
zzzvYek8ql9OZs2 zzzvYek8ql9OZs2 vQevgvyHUmd0XdEQPrRP2k6Sdf0acMflxjMJuCRK  
zzzxJkOpV02fpYV zzzxJkOpV02fpYV R2RvD9V8Wj59jp2pEquT7pCniVUJ2tfEprRuf6CK  
zzxtBJpvKAyeAj zzzxtBJpvKAyeAj ajFZy4Gab6uPbbNME4EOc6NfYM1DLJC4jfuqGPsR  
zzzy8SA6bUgHCML zzzzy8SA6bUgHCML 0DyjlV3Qr8h7vbESRn0ffNr5PIDzdXPzk4jB47f9  
zzzyEq5lcqyinSK zzzzyEq5lcqyinSK 1aR2VRYqS1hjYMvILLcS2pcCQRA4HW4Minhn62IV  
zzzylkOstrV5Qle zzzylkOstrV5Qle D6YjfF9TtEa7NRz9y64nPVrcKUz1U7kCAxpHbBKL  
zzzyRCIBhs5chdA zzzzyRCIBhs5chdA vzyuXlye2ktexkgXnQXmySAXHoieXF0jPKUdWSTU  
zzzyvJ5FMgenBGa zzzzyvJ5FMgenBGa WVq6ZMqITXWmLthY5tJ83oq5VxoHXJjngevrZL4U  
zzzzJXxBguTEdpM zzzzJXxBguTEdpM eWMIDSpNIWHUWXuttIFkbCV84pRprMucRjpmmyQ7

## Experiment 2

We were able to sort the 50m data set.

Our strategy for experiment 2 was to convert the key value into a base-75 numeric contained within a BigInteger object. From there, we procedurally calculate the divisions within a maximum base-75 value, "zzzzzzzzzzzzzzzz", to determine which partition a given key should be passed to.

That is, a given partition value range, *seg*, and a key, *k*:

```
seg := zzzzzzzzzzzzzzzzz / 10;  
for i := 0; i < numPartitions; i++ {  
    div := seg * (i + 1)  
  
    // If in this range, return this partition  
    if(k <= div)  
        return i  
  
    // If the value is outside our ability to bind with segments  
    if(k > seg * numPartitions)  
        return numPartitions-1  
}
```

The presence of the BigInteger values, a space in which all of our mathematical procedures are performed, including comparisons, implies that our maximum key value size is  $(2^{32})^{\text{Integer.MAX\_VALUE}}$  or so.

**usage:** hadoop jar Lab4Exp2.jar exp2.Lab4Exp2

## Partition 0

0000PD9thXhXofi chun0MZlmM5N9UrMKCqgqocrhEDX2Nqm6iTpsR4A

0000TGabjLm2YOU IU8KDXmPn6z1CY1Gjmoi2VzsKrRE1b9s7nA1ZhCB  
0000fkuE2hrDZsr c5rySnBIAFAi6np83GNYu9j6UHOeBBy1UJ4KAtQQ  
0000kbCSxbEOcJ6 qJzh1CyhvhCnKmH839CaSJn3snrOF62UAuRVPWPE  
0000p0psH4tAXvp XNFIJMZ2hKUtUFI6KJngzCAsSxnqDmLfEkb1T6Ag

...

7UUSgfNS1b2Sa3G YNnu8u4prFDIdHSVFxRUPoQXKgBn6VC9xNa0upAP  
7UUTBzi3YFM3WPR HX3198QHHeIDn4HWDyUKzQEozdgi0pNDBqNNSrx  
7UUTHBlixQgrj7o eaMzpZMj0VckR5qIRANP6cbnLBjzedFJxW7z3NIW  
7UUTN06g1CGHpQo BmUAZ3HWlqXG9fBNdOp7Yrb7d0eSzyZlxJJPvlqb  
7UUUNZPVF1YWmug meZJ5U4KHPJYphCOiopISUqiKqHBZ5gImO1CFf43

### Partition 1

7UUUjuVSW6EZNNNo PYibRUBol28TyAzP8rzkHf5a2ng32bNkDmlua550  
7UUUr05IEPXnjTk iXfribPuWbD8aBjTfqgeQGE4gPOBt4pJQxAKBuam  
7UUUvO4EW9baF8t 7jWIRuOcrFHDYU90OL71QAra28G7JmcEA88JPiGr  
7UUUVxGgP48AO2es ZF0mUO8LRtTOxqTbxmrp7QoZq9536BkuYOvd2cCP  
7UUW2qOT7i6bBIF TojX0YMybzNJB9SvY1Q723eMEpdKWdGbkn7tQKpF

...

9zzxqEeMdBAy2M8 x6SRzmQaB0kDMuYIGbJ8CTqMjArDUZuUkerk7j1V  
9zzyThsa47j5ebU abHgauzsuvrdKrQ6mVaO11EblQosx6Q3CnvuyBON  
9zzzDYdT9dqGeID DGnIG5SBSSToWQFNbojWsaW19KJDz4HqLj3sEqTZ  
9zzzoHTslugolyW 21dZIPOXejL987dm1PRYjIA1JK0LEmitxIRDLWZI  
9zzzuM9UptdEM4Y UviL5vnCDhDx7Ex7qn0u9NAk848bbjo49CO5sq6o

### Partition 2

A000S8pMlqK5UTU sjKbZCU9ysXX2JeAsHv20KXOfjHqeIWVNdBst2WA  
A000bBX9Qql92rT 4hfMbHtMWeEQPYjlzWpJF9msokjtr8m4HDPk4aqd  
A000nL10AQzgf9I UbU72hHSBCgAyeugFzhy2mM3fumx5robWCIKE7co  
A000sHPcFcsYgQP uiZCXu61A17f0WlqljUkm2eD1KTr3Homl0qIC5ec  
A001MgPifDkRYbH V0FKiq89v5h5nBR1uq8nml2Jh1XMLxmu6ZDO6HhF

...

FUURoWJhYyNOJUK B5zybSQjTtmQaz2FeIAyglNH2JdlIgUYY30hVavK  
FUURsHyypHAV8gv HMOEa27A8IHYP68PW6uULJY4NrYgrpRqrdYLbKW  
FUUTNN6NuJgmWgt W74masVP9T1pef8KsUc8PiIVfKHHHEY7IPIKQBVQ  
FUUTanPSjWkAn3i AbqllduQ5Mtg18CSWkcaZ9N0D93yXUvvUV5XXIIH  
FUUUFLEI2xq8hdr toli1ydfgtY9vf6gH4m1MkMLjXHBOze27f7iXNvM

### Partition 3

FUUUhFVlbSALGFM o3YrcQ04bg3hagPk0eFMWQCCtftpUVAJBvx6VPW7o  
FUUUihZBcMoPNbS ia6oDzukBpbCh5zLUOE9jKSd5XIO6Pn19kMfRFsv  
FUUUk1vbmC28sLH DK8hY5gLpbFJkSY1csN4zXqpZ0allZ6KWeIToEVx



FUUUkjnCYCeCiVi po7Tdn4hVvyvRQeuszXMfXf9pKOYsRvnWWZ9LYvx  
FUUUUmQNBHbxLlyd UDimxbAjjx4ZS0o4jWaujy2K1IFZ4YEXZCID8uq9

...

MzzzJ4yqWOynZW8 tfDXuh4xGnuDNcdqJRKXEFvrE4RjVBUZ4egvI7iG  
MzzzKL3oY87EqOn 6KzFKCCkcYheMe6pJ4M9Tu1POESWPZnmloCcBOCL  
MzzzabxeEOQcfDi 4mjMDLO8Ng1umJEACCGQIS6zJT7yDNQUoQNHjVEv  
MzzzcoYQH6PJtpx uP5RXcrBFJ7OSLZCxVD9DarOKy9LU70cGD8lvUCy  
MzzzizdYnA1qDmv nW7BylEAmCaJdJjyEk4ap3tbhJ3t2cOmbSm9gJdH

#### Partition 4

N000HCX3SKFrZAh y0Bf0XkskXEk50icHPPhJlGmFhJgElmrnk6LxGYS  
N000PzZP37UCg8n nOQpEQFnefszLG2P0FPzuN1OxtMnAQgFTqvpAze8  
N000II3ETRiDQmt kb2DEpq5G4CBq5xpJ80fOOd8PoPjyMTZ20hvD5On  
N001TFgi3hFknC5 Zs7SGfxFtQpbBHoMQBQ1lpRCTNxfX8SEKn8dZ2YJ  
N001XG68ldq4yU4 JKdBzxrzhnC0iJRCUsmZ9mSUkhgIKssPCZ1Kz7mE

...

UUUTuQFRx0cbK1d 1CyoY97payO1JmDI6yUH4FZQZ1dPSc0VZe4ClJji  
UUUTvuXSevSzTBp P6QgCmT2qgJeOsMG92pebj0ezGiv3EaWoinXo9ZY  
UUUU5dPOfxihkcZ KnO6rANvv1zGQclxFGEuxLg5cvZNs0TOsy1xJmNn  
UUUUHFhercofeaq EVYba2Yiry0YLIFImaN80pcfECkBgGA4Q0TP2rQu  
UUUUJR8IU2JAmjH 33VLaNFnUKkWrbW5yJChNyheEcVMxNtuOpE68hNK

#### Partition 5

UUUVbFXCpeKiovk hN5P6QtI0N5xbdiXOh8XBlnGbtjVWqeBVsxkxTEg  
UUUVeIK1P2maX9U 1Oy8CPQtoVVMh8IJQUHqFtr9t36OtB3ilo1KW9TO  
UUUVr63AQgX0fuS Wrchx0Jrj6dlsc6vZd21HvzXmgQ03ZP0kEYphO2B  
UUUW1NkvMYTzCe6 MWXxe6hssL7ZmV0TkXdUEmgGdiSrij7jXCOgkzbZE  
UUUWEICfUldfJTt 6GO8RTcUuEeoa5niS1HHvFrAOPrMD12Rzqf3V0Lr

...

ZzzyeyO0VqjNMqj PgT5sqeF50neTQg1tM9OfRAhmjl2BCqr90tDmMZu  
ZzzypD9M3Koyy41 RZCjOq32aLPrdCRJb0u9qQvFSsoiZTeAUqatV7IC  
ZzzzVImn5ct0YNs jqPQ0TCtbet3eqeol8lBnK8aZ1LkznBPelECvFBA  
ZzzzeJ0aDYXEyOk yjK4VUSyoP6O24a2LvXmfWqA9lYufaypuAkTQOCC  
ZzzziBNJDikKlH3 FTT3ORnQzAn638rmFTWtnEPxECOqoTq4YAshIU7v

#### Partition 6

a0007PKJ1nCU1xx ZplgEAKSokEyeLpKrgx9e0cxmQ9QdkbVLTsNaFgl  
a000Yn8zAN0tqQp bmFhdB5IB84nFSScJ4g125hdkJrQT0bRosiUcLv9  
a000rMEmLFyhLHm KO1SDcfEyfGTh0rRDTjl0Tu5s6PqXq2AeuTuu1Oq  
a000xME8CIJvftV HrzoE4nmQzUg8miuJgyCcV2MrXhfAmhDodSxWTsa  
a0016UR8bnaBUkB 8dIPQt1VZGXl9UbKILbfgEDH5o5EQt8gvjt7s34e

...

dUUTUi8VtYozUI5 iEd5Ski5uOWX5UgD34vbpYf2kZQ8HyksQYDmHW5d  
dUUTXtHWUTQPuF0 px9N2Ok9bYNhblOsR6SrZnC3ts6te8vHmaH23vYd  
dUUTazdVBQVSjF1 8KJQ3tUN8ApK0hxKOV6BAVXdelGE7Y9z0hPN9Hq5  
dUUU9kbnS3F8nag BILIL6KTsbLN1FYyT5NypiqBZiTgPJEDcmMX6RzP  
dUUUNeh0soMo0mn HvUcRq1YpYlCj7JNYam4pRCPsK6GC7fYcoszy1S2

#### Partition 7

dUUUadQSEZYFbfg DIingHYNxuQrjqRtOrK8ohNrlEqxIQYPdcWq7jpZU  
dUUUeyrRnqB4e9J mHTJh4vbgSa7U0Byli2jjbqJTExiG2gxD88vMxoG  
dUUUx7D5z5iy4nW YQ9r6yB1cxa5yemkjRJfnbyPq1nP0vjeBGRG0ZE  
dUUUz4R0prAToQs 9M0KeAB77vc6XVMYJVrBcYCHIMdxzHsCSkCmFJ5m  
dUUUzBVtRt4E6rH 3HJlInCnVxjtSpMU6DBtChYyQ7xWGB1HtxJ6GaK  
...  
kzzz2DNOQMX3yFn 4PmSQbQYePV7f0z1GcoZLTDOGSorZJKem0JK9hka  
kzzzMM1UA70pjpU G4Y0u7VH8o4gjhZcuMPtDC9qb5k3A6sUpqCTdJ4t  
kzzzfbLKf83fr6t Qa5MOhJEo3gcMPSxndzxr1820DLqzsMj7v66WmlS  
kzzzioufpuX6vWH bUeVf9rbvUbtWenuZ1colsOmRvIFy8IRK08tk07e  
kzzzuX1RYGuFsJK Yp6g2PzqWr0Gn4Vv372CYVnQFDHkz27WjN3Block

#### Partition 8

I000LspztGep77J 8GcQ7Oejt40Nr6xby4XSjhq9ozui79FzFDaZE4He  
I000NiW7A5mCciV Tjs9O4pXWQjiD0rVuASU0PtIRFdmKPHIcAbjHEJ0  
I000SpBVF8zyHIK OXpFNfEhzpdf14RKCSVAZRCJMdlTLcMXBxnW2TH  
I001aV0D4vaK5B8 UTbdBJZMSia5S52faOaFeBHxNxN9SmCj2Tr2Tiul  
I001rTIAQLySJfW EZdchrhJQs8NVF0OZxFudGrYBYgMOP0HK9Vutulb  
...  
sUUTPWxRrDbWxep 56hatfBDCLx0n45qAnX44g5qViyHe8hFXMn1DLJy  
sUUTZHMoukrhs7o i7jPpQNPxc4yAUsmWFL2He5eQQcVo8HWIVqPIgNI  
sUUTnxelAjm9AQc 3VFSgdFBS1QVNJFeVVpsGcFzyppss5cjRjhpIg4N  
sUUU9aq1BWKIhxe NKQVbjix07p3k9G71XAPSddEWOnfsiHJFG9tVRyG  
sUUUTvleQ2Yk0s1 lJsfEA2Q7XAsrJZ5agQxIRTR17hAK2GKID3npyFt

#### Partition 9

sUUUaGnThFud0be lbsE0gUqzJ53o6lqRT8mxz7cL0VBn3dRPIQ5m39D  
sUUUlfZNSt1KRKu 7KdccnE1CHj8dol77QA2r2FYOXhnUTJqNy05SC3h  
sUUUrVFBek0ypRA A4x4bFA6WmEhf4cpozJF74kYmzVc738sAYcldbK3  
sUUUz6BUyH837Y9 5zOza2slyfJ7vBugIFnLWjnTJGPUmystorezJjTpZY  
sUUVADeHdNG6bLc OZQgUyHMBkKxrN0htzNP3t5DF0Am0F4YJVIYUVAc  
...  
zzzyEq5lcqyinSK 1aR2VRYqS1hjYMvILLcS2pcCQRA4HW4Minhn62IV  
zzzyIkOstrV5Qle D6YfjF9TtEa7NRz9y64nPVRcKUz1U7kCAxpHbBKL

zzzyRCIBhs5chdA vzyuXlYe2ktexkgXnQXmySAXHoieXF0jPKUdWSTU  
zzzyvJ5FMgenBGa WVq6ZMqITXWmLthY5tJ83oq5VxoHXJjngevZL4U  
zzzzJXxBguTEdpM eWMIDSpNIWHUWXuttIFkbCV84pRprMucRjpmYyQ7