

DSC 650 – Big Data

Week 6 Assignment

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```
rsa-key-20240315@dsc650-kueviakoe: ~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase
Use "exit" to quit this interactive shell.
For Reference, please visit: http://hbase.apache.org/2.0/book.html#shell
Version 2.3.6, r7414579f2620fca6b75146c29ab2726fc4643ac9, Wed Jul 28 22:24:42 UTC 2021
Took 0.0021 seconds
hbase(main):001:0> create 'students', 'details'
Created table students
Took 1.9336 seconds
=> Hbase::Table - students
hbase(main):002:0>
```

Screenshot of the table creation command and its output

```
rsa-key-20240315@dsc650-kueviakoe: ~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase
hbase(main):056:0* list
TABLE
students
1 row(s)
Took 0.0411 seconds
=> ["students"]
hbase(main):057:0> █
```

Screenshot of the tables listed in HBase

```

rsa-key-20240315@dsc650-kueviakoe: ~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase
hbase(main):056:0> list
TABLE
students
1 row(s)
Took 0.0411 seconds
=> ["students"]
hbase(main):057:0> put 'students', '1', 'details:firstName', 'John'
Took 0.3007 seconds
hbase(main):058:0> put 'students', '1', 'details:lastName', 'Doe'
Took 0.0108 seconds
hbase(main):059:0> 

```

Screenshot of the commands used to add data and their outputs.

```

rsa-key-20240315@dsc650-kueviakoe: ~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase
hbase(main):059:0> get 'students', '1'
COLUMN                                CELL
details:firstName                      timestamp=2024-04-17T18:41:10.770, value=John
details:lastName                      timestamp=2024-04-17T18:41:21.486, value=Doe
1 row(s)
Took 0.0691 seconds
hbase(main):060:0> 

```

Screenshot of the query (get 'students', '1') and its output

```

rsa-key-20240315@dsc650-kueviakoe: ~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase
hbase(main):060:0>
hbase(main):060:0> create 'orders', 'orderDetails'
Created table orders
Took 0.6625 seconds
=> Hbase::Table - orders
hbase(main):061:0> put 'orders', '101:20230806', 'orderDetails:item', 'Laptop'
Took 0.0378 seconds
hbase(main):062:0> put 'orders', '102:20230806', 'orderDetails:item', 'Smartphone'
Took 0.0077 seconds
hbase(main):063:0>
hbase(main):063:0> scan 'orders', {STARTROW => '101:', ENDROW => '101:~'}
ROW                                COLUMN+CELL
101:20230806                      column=orderDetails:item, timestamp=2024-04-17T18:45:30.420, value=Laptop
1 row(s)
Took 0.0187 seconds
hbase(main):064:0>

```

Screenshot of the commands used to query the data with composite key and their outputs

```
hbase(main):066:0*
hbase(main):067:0*
hbase(main):068:0* (2..100).each do |i|
hbase(main):069:1*   first_name = "Student#{i}"
hbase(main):070:1>   last_name = "LastName#{i}"
hbase(main):071:1>   put 'students', "#{i}", 'details:firstName', first_name
hbase(main):072:1>   put 'students', "#{i}", 'details:lastName', last_name
hbase(main):073:1> end
Took 0.0163 seconds
Took 0.0071 seconds
Took 0.0068 seconds
Took 0.0062 seconds
Took 0.0056 seconds
Took 0.0056 seconds
Took 0.0052 seconds
Took 0.0057 seconds
Took 0.0053 seconds
Took 0.0053 seconds
Took 0.0058 seconds
Took 0.0064 seconds
Took 0.0050 seconds
```

```
hbase(main):075:0> scan 'students'
ROW
1      COLUMN+CELL
1      column=details:firstName, timestamp=2024-04-17T18:41:10.770, value=John
1      column=details:lastName, timestamp=2024-04-17T18:41:21.486, value=Doe
10     column=details:firstName, timestamp=2024-04-17T18:49:17.870, value=Student10
10     column=details:lastName, timestamp=2024-04-17T18:49:17.878, value=LastName10
100    column=details:firstName, timestamp=2024-04-17T18:49:18.987, value=Student100
100    column=details:lastName, timestamp=2024-04-17T18:49:18.995, value=LastName100
11     column=details:firstName, timestamp=2024-04-17T18:49:17.885, value=Student11
11     column=details:lastName, timestamp=2024-04-17T18:49:17.892, value=LastName11
12     column=details:firstName, timestamp=2024-04-17T18:49:17.899, value=Student12
12     column=details:lastName, timestamp=2024-04-17T18:49:17.905, value=LastName12
13     column=details:firstName, timestamp=2024-04-17T18:49:17.911, value=Student13
13     column=details:lastName, timestamp=2024-04-17T18:49:17.918, value=LastName13
14     column=details:firstName, timestamp=2024-04-17T18:49:17.929, value=Student14
14     column=details:lastName, timestamp=2024-04-17T18:49:17.936, value=LastName14
15     column=details:firstName, timestamp=2024-04-17T18:49:17.943, value=Student15
15     column=details:lastName, timestamp=2024-04-17T18:49:17.949, value=LastName15
16     column=details:firstName, timestamp=2024-04-17T18:49:17.955, value=Student16
16     column=details:lastName, timestamp=2024-04-17T18:49:17.961, value=LastName16
17     column=details:firstName, timestamp=2024-04-17T18:49:17.967, value=Student17
17     column=details:lastName, timestamp=2024-04-17T18:49:17.977, value=LastName17
18     column=details:firstName, timestamp=2024-04-17T18:49:17.987, value=Student18
18     column=details:lastName, timestamp=2024-04-17T18:49:17.995, value=LastName18
19     column=details:firstName, timestamp=2024-04-17T18:49:18.003, value=Student19
19     column=details:lastName, timestamp=2024-04-17T18:49:18.010, value=LastName19
2      column=details:firstName, timestamp=2024-04-17T18:49:17.755, value=Student2
2      column=details:lastName, timestamp=2024-04-17T18:49:17.767, value=LastName2
20     column=details:firstName, timestamp=2024-04-17T18:49:18.018, value=Student20
96     column=details:firstName, timestamp=2024-04-17T18:49:18.934, value=Student96
96     column=details:lastName, timestamp=2024-04-17T18:49:18.939, value=LastName96
97     column=details:firstName, timestamp=2024-04-17T18:49:18.949, value=Student97
97     column=details:lastName, timestamp=2024-04-17T18:49:18.955, value=LastName97
98     column=details:firstName, timestamp=2024-04-17T18:49:18.961, value=Student98
98     column=details:lastName, timestamp=2024-04-17T18:49:18.965, value=LastName98
99     column=details:firstName, timestamp=2024-04-17T18:49:18.971, value=Student99
99     column=details:lastName, timestamp=2024-04-17T18:49:18.980, value=LastName99
100 row(s)
Took 0.1804 seconds
hbase(main):077:0> █
```

Screenshot of the commands used for data generation and their outputs

HBase data manipulation

1. Update First Names: For students with IDs from 2 to 50, change the first name prefix from Student to Scholar. For instance, Student3 should become Scholar3.

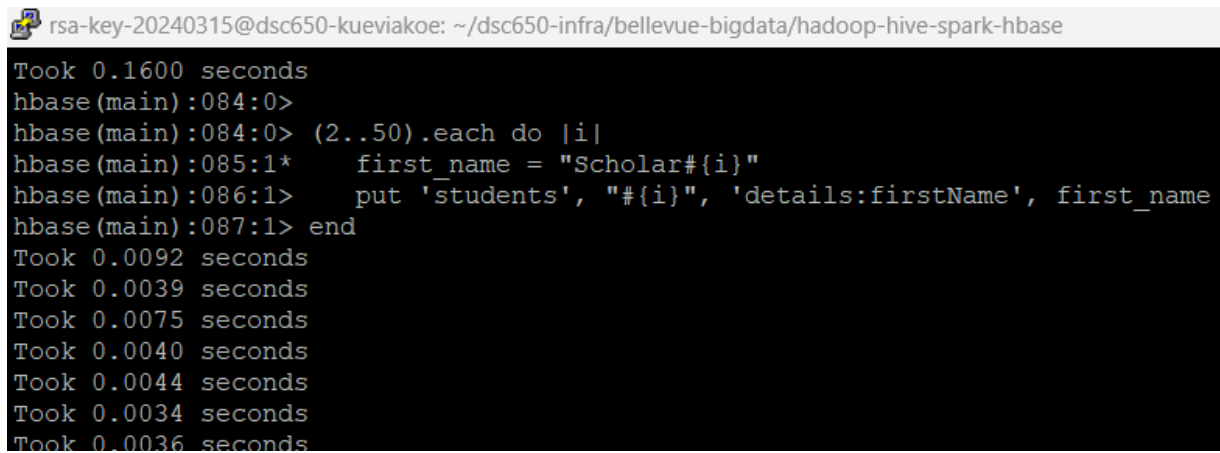
Code:

```
(2..50).each do |i|
```

```
  first_name = "Scholar#{i}"
```

```
  put 'students', "#{i}", 'details:firstName', first_name
```

```
end
```



A terminal window showing the execution of HBase shell commands. The window title is "rsa-key-20240315@dsc650-kueviakoe: ~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase". The terminal output shows the execution of the code block above, with timing information for each command.

```
Took 0.1600 seconds
hbase(main):084:0>
hbase(main):084:0> (2..50).each do |i|
hbase(main):085:1*   first_name = "Scholar#{i}"
hbase(main):086:1>   put 'students', "#{i}", 'details:firstName', first_name
hbase(main):087:1> end
Took 0.0092 seconds
Took 0.0039 seconds
Took 0.0075 seconds
Took 0.0040 seconds
Took 0.0044 seconds
Took 0.0034 seconds
Took 0.0036 seconds
```

```

Took 0.0039 seconds
Took 0.0044 seconds
=> 2..50
hbase(main):088:0> scan 'students'
ROW                                COLUMN+CELL
1                                  column=details:firstName, timestamp=2024-04-17T18:41:10.770, value=John
1                                  column=details:lastName, timestamp=2024-04-17T18:41:21.486, value=Doe
10                                 column=details:firstName, timestamp=2024-04-17T19:14:58.635, value=Scholar10
10                                 column=details:lastName, timestamp=2024-04-17T18:49:17.878, value=LastName10
100                                column=details:firstName, timestamp=2024-04-17T18:49:18.987, value=Student100
100                                column=details:lastName, timestamp=2024-04-17T18:49:18.995, value=LastName100
11                                 column=details:firstName, timestamp=2024-04-17T19:14:58.640, value=Scholar11
11                                 column=details:lastName, timestamp=2024-04-17T18:49:17.892, value=LastName11
12                                 column=details:firstName, timestamp=2024-04-17T19:14:58.644, value=Scholar12
12                                 column=details:lastName, timestamp=2024-04-17T18:49:17.905, value=LastName12
13                                 column=details:firstName, timestamp=2024-04-17T19:14:58.648, value=Scholar13
13                                 column=details:lastName, timestamp=2024-04-17T18:49:17.918, value=LastName13
14                                 column=details:firstName, timestamp=2024-04-17T19:14:58.653, value=Scholar14
14                                 column=details:lastName, timestamp=2024-04-17T18:49:17.936, value=LastName14
15                                 column=details:firstName, timestamp=2024-04-17T19:14:58.658, value=Scholar15
15                                 column=details:lastName, timestamp=2024-04-17T18:49:17.949, value=LastName15
16                                 column=details:firstName, timestamp=2024-04-17T19:14:58.662, value=Scholar16
16                                 column=details:lastName, timestamp=2024-04-17T18:49:17.961, value=LastName16
17                                 column=details:firstName, timestamp=2024-04-17T19:14:58.667, value=Scholar17
17                                 column=details:lastName, timestamp=2024-04-17T18:49:17.977, value=LastName17
18                                 column=details:firstName, timestamp=2024-04-17T19:14:58.671, value=Scholar18
18                                 column=details:lastName, timestamp=2024-04-17T18:49:17.995, value=LastName18
19                                 column=details:firstName, timestamp=2024-04-17T19:14:58.675, value=Scholar19
19                                 column=details:lastName, timestamp=2024-04-17T18:49:18.010, value=LastName19
2                                  column=details:firstName, timestamp=2024-04-17T19:14:58.590, value=Scholar2
2                                  column=details:lastName, timestamp=2024-04-17T18:49:17.767, value=LastName2
20                                 column=details:firstName, timestamp=2024-04-17T19:14:58.679, value=Scholar20
20                                 column=details:lastName, timestamp=2024-04-17T18:49:18.024, value=LastName20
21                                 column=details:firstName, timestamp=2024-04-17T19:14:58.683, value=Scholar21
21                                 column=details:lastName, timestamp=2024-04-17T18:49:18.040, value=LastName21
22                                 column=details:firstName, timestamp=2024-04-17T19:14:58.689, value=Scholar22
22                                 column=details:lastName, timestamp=2024-04-17T18:49:18.071, value=LastName22
23                                 column=details:firstName, timestamp=2024-04-17T19:14:58.694, value=Scholar23
23                                 column=details:lastName, timestamp=2024-04-17T18:49:18.086, value=LastName23
24                                 column=details:firstName, timestamp=2024-04-17T19:14:58.697, value=Scholar24
24                                 column=details:lastName, timestamp=2024-04-17T18:49:18.107, value=LastName24
25                                 column=details:firstName, timestamp=2024-04-17T19:14:58.701, value=Scholar25
25                                 column=details:lastName, timestamp=2024-04-17T18:49:18.120, value=LastName25
26                                 column=details:firstName, timestamp=2024-04-17T19:14:58.706, value=Scholar26

```

2. Add a Middle Name: For students with IDs from 51 to 75, add a middle name column under the details column family. The middle name should follow the pattern `MidName#{i}`.

Code:

```

(51..75).each do |i|

  middle_name = "MidName#{i}"

  put 'students', "#{i}", 'details:middleName', middle_name

end

```

```

Took 0.1767 seconds
hbase(main):089:0> (51..75).each do |i|
hbase(main):090:1*   middle_name = "MidName#{i}"
hbase(main):091:1>   put 'students', "#{i}", 'details:middleName', middle_name
hbase(main):092:1> end
Took 0.0258 seconds
Took 0.0102 seconds
Took 0.0070 seconds
Took 0.0087 seconds
Took 0.0099 seconds
Took 0.0041 seconds
Took 0.0046 seconds
Took 0.0043 seconds
Took 0.0036 seconds
Took 0.0101 seconds
Took 0.0051 seconds
Took 0.0038 seconds
Took 0.0036 seconds
Took 0.0035 seconds
Took 0.0076 seconds
Took 0.0039 seconds
Took 0.0031 seconds
Took 0.0036 seconds
Took 0.0041 seconds
Took 0.0107 seconds
Took 0.0034 seconds
Took 0.0032 seconds
Took 0.0038 seconds
Took 0.0047 seconds
Took 0.0068 seconds
=> 51..75

```

```

51      column=details:firstName, timestamp=2024-04-17T18:49:18.430, value=Student51
51      column=details:lastName, timestamp=2024-04-17T18:49:18.434, value=LastName51
51      column=details:middleName, timestamp=2024-04-17T19:28:45.710, value=MidName51
52      column=details:firstName, timestamp=2024-04-17T18:49:18.439, value=Student52
52      column=details:lastName, timestamp=2024-04-17T18:49:18.445, value=LastName52
52      column=details:middleName, timestamp=2024-04-17T19:28:45.736, value=MidName52
53      column=details:firstName, timestamp=2024-04-17T18:49:18.449, value=Student53
53      column=details:lastName, timestamp=2024-04-17T18:49:18.454, value=LastName53
53      column=details:middleName, timestamp=2024-04-17T19:28:45.744, value=MidName53
54      column=details:firstName, timestamp=2024-04-17T18:49:18.459, value=Student54
54      column=details:lastName, timestamp=2024-04-17T18:49:18.466, value=LastName54
54      column=details:middleName, timestamp=2024-04-17T19:28:45.752, value=MidName54
55      column=details:firstName, timestamp=2024-04-17T18:49:18.477, value=Student55
55      column=details:lastName, timestamp=2024-04-17T18:49:18.486, value=LastName55
55      column=details:middleName, timestamp=2024-04-17T19:28:45.758, value=MidName55
56      column=details:firstName, timestamp=2024-04-17T18:49:18.493, value=Student56
56      column=details:lastName, timestamp=2024-04-17T18:49:18.500, value=LastName56
56      column=details:middleName, timestamp=2024-04-17T19:28:45.768, value=MidName56
57      column=details:firstName, timestamp=2024-04-17T18:49:18.507, value=Student57
57      column=details:lastName, timestamp=2024-04-17T18:49:18.515, value=LastName57
57      column=details:middleName, timestamp=2024-04-17T19:28:45.773, value=MidName57
58      column=details:firstName, timestamp=2024-04-17T18:49:18.521, value=Student58
58      column=details:lastName, timestamp=2024-04-17T18:49:18.529, value=LastName58
58      column=details:middleName, timestamp=2024-04-17T19:28:45.779, value=MidName58
59      column=details:firstName, timestamp=2024-04-17T18:49:18.534, value=Student59
59      column=details:lastName, timestamp=2024-04-17T18:49:18.538, value=LastName59
59      column=details:middleName, timestamp=2024-04-17T19:28:45.784, value=MidName59
6      column=details:firstName, timestamp=2024-04-17T19:14:58.618, value=Scholar6
6      column=details:lastName, timestamp=2024-04-17T18:49:17.825, value=LastName6
60      column=details:firstName, timestamp=2024-04-17T18:49:18.547, value=Student60
60      column=details:lastName, timestamp=2024-04-17T18:49:18.552, value=LastName60
60      column=details:middleName, timestamp=2024-04-17T19:28:45.788, value=MidName60
61      column=details:firstName, timestamp=2024-04-17T18:49:18.558, value=Student61
61      column=details:lastName, timestamp=2024-04-17T18:49:18.565, value=LastName61
61      column=details:middleName, timestamp=2024-04-17T19:28:45.800, value=MidName61
62      column=details:firstName, timestamp=2024-04-17T18:49:18.570, value=Student62
62      column=details:lastName, timestamp=2024-04-17T18:49:18.574, value=LastName62
62      column=details:middleName, timestamp=2024-04-17T19:28:45.806, value=MidName62

```

3. Modify Last Names: For students with IDs from 76 to 100, append `_Modified` to the last name. So, `LastName76` should be updated to `LastName76_Modified`.

Code:

```
(76..100).each do |i|  
  
  put 'students', "#{i}", 'details:lastName', "LastName#{i}_Modified"  
  
end
```

```
hbase(main):094:0> (76..100).each do |i|  
hbase(main):095:1*   put 'students', "#{i}", 'details:lastName', "LastName#{i}_Modified"  
hbase(main):096:1> end  
Took 0.0218 seconds  
Took 0.0037 seconds  
Took 0.0033 seconds  
Took 0.0030 seconds  
Took 0.0040 seconds  
Took 0.0026 seconds  
Took 0.0027 seconds  
Took 0.0028 seconds  
Took 0.0027 seconds  
Took 0.0025 seconds  
Took 0.0025 seconds  
Took 0.0032 seconds  
Took 0.0034 seconds  
Took 0.0029 seconds  
Took 0.0034 seconds  
Took 0.0034 seconds  
Took 0.0034 seconds  
Took 0.0031 seconds  
Took 0.0030 seconds  
Took 0.0030 seconds  
Took 0.0032 seconds  
Took 0.0048 seconds  
Took 0.0036 seconds  
Took 0.0055 seconds  
Took 0.0038 seconds  
=> 76..100  
hbase(main):097:0> █
```

```

79      column=details:firstName, timestamp=2024-04-17T18:49:18.722, value=Student79
79      column=details:lastName, timestamp=2024-04-17T20:02:14.622, value=LastName79_Modified
8      column=details:firstName, timestamp=2024-04-17T19:14:58.627, value=Scholar8_
8      column=details:lastName, timestamp=2024-04-17T18:49:17.851, value=LastName8
80      column=details:firstName, timestamp=2024-04-17T18:49:18.735, value=Student80
80      column=details:lastName, timestamp=2024-04-17T20:02:14.625, value=LastName80_Modified
81      column=details:firstName, timestamp=2024-04-17T18:49:18.747, value=Student81
81      column=details:lastName, timestamp=2024-04-17T20:02:14.630, value=LastName81_Modified
82      column=details:firstName, timestamp=2024-04-17T18:49:18.765, value=Student82
82      column=details:lastName, timestamp=2024-04-17T20:02:14.633, value=LastName82_Modified
83      column=details:firstName, timestamp=2024-04-17T18:49:18.779, value=Student83
83      column=details:lastName, timestamp=2024-04-17T20:02:14.636, value=LastName83_Modified
84      column=details:firstName, timestamp=2024-04-17T18:49:18.789, value=Student84
84      column=details:lastName, timestamp=2024-04-17T20:02:14.640, value=LastName84_Modified
85      column=details:firstName, timestamp=2024-04-17T18:49:18.800, value=Student85
85      column=details:lastName, timestamp=2024-04-17T20:02:14.643, value=LastName85_Modified
86      column=details:firstName, timestamp=2024-04-17T18:49:18.813, value=Student86
86      column=details:lastName, timestamp=2024-04-17T20:02:14.646, value=LastName86_Modified
87      column=details:firstName, timestamp=2024-04-17T18:49:18.825, value=Student87
87      column=details:lastName, timestamp=2024-04-17T20:02:14.649, value=LastName87_Modified
88      column=details:firstName, timestamp=2024-04-17T18:49:18.838, value=Student88
88      column=details:lastName, timestamp=2024-04-17T20:02:14.653, value=LastName88_Modified
89      column=details:firstName, timestamp=2024-04-17T18:49:18.848, value=Student89
89      column=details:lastName, timestamp=2024-04-17T20:02:14.657, value=LastName89_Modified
9      column=details:firstName, timestamp=2024-04-17T19:14:58.631, value=Scholar9_
9      column=details:lastName, timestamp=2024-04-17T18:49:17.864, value=LastName9
90      column=details:firstName, timestamp=2024-04-17T18:49:18.863, value=Student90
90      column=details:lastName, timestamp=2024-04-17T20:02:14.660, value=LastName90_Modified
91      column=details:firstName, timestamp=2024-04-17T18:49:18.876, value=Student91
91      column=details:lastName, timestamp=2024-04-17T20:02:14.664, value=LastName91_Modified
92      column=details:firstName, timestamp=2024-04-17T18:49:18.889, value=Student92
92      column=details:lastName, timestamp=2024-04-17T20:02:14.669, value=LastName92_Modified
93      column=details:firstName, timestamp=2024-04-17T18:49:18.902, value=Student93
93      column=details:lastName, timestamp=2024-04-17T20:02:14.673, value=LastName93_Modified
94      column=details:firstName, timestamp=2024-04-17T18:49:18.913, value=Student94
94      column=details:lastName, timestamp=2024-04-17T20:02:14.676, value=LastName94_Modified
95      column=details:firstName, timestamp=2024-04-17T18:49:18.923, value=Student95
95      column=details:lastName, timestamp=2024-04-17T20:02:14.680, value=LastName95_Modified
96      column=details:firstName, timestamp=2024-04-17T18:49:18.934, value=Student96
96      column=details:lastName, timestamp=2024-04-17T20:02:14.684, value=LastName96_Modified
97      column=details:firstName, timestamp=2024-04-17T18:49:18.949, value=Student97
97      column=details:lastName, timestamp=2024-04-17T20:02:14.689, value=LastName97_Modified
98      column=details:firstName, timestamp=2024-04-17T18:49:18.961, value=Student98
98      column=details:lastName, timestamp=2024-04-17T20:02:14.694, value=LastName98_Modified
99      column=details:firstName, timestamp=2024-04-17T18:49:18.971, value=Student99
99      column=details:lastName, timestamp=2024-04-17T20:02:14.699, value=LastName99_Modified
100 row(s)

```

4. Bulk Delete: Delete all the details for students with IDs from 90 to 100.

Code:

```

(90..100).each do |i|

  deleteall 'students', "#{i}"

end

```



```
hbase(main):045:1* deleteall 'students', "#{i}"
hbase(main):046:1> end
Took 0.0053 seconds
Took 0.0040 seconds
Took 0.0036 seconds
Took 0.0045 seconds
Took 0.0069 seconds
Took 0.0038 seconds
Took 0.0061 seconds
Took 0.0060 seconds
Took 0.0037 seconds
Took 0.0045 seconds
Took 0.0060 seconds
=> 90..100
```

```
79 column=details:firstName, timestamp=2024-04-17T18:49:18.722, value=Student79
79 column=details:lastName, timestamp=2024-04-17T20:02:14.622, value=LastName79_Modified
8 column=details:firstName, timestamp=2024-04-17T19:14:58.627, value=Scholar8
8 column=details:lastName, timestamp=2024-04-17T18:49:17.851, value=LastName8
80 column=details:firstName, timestamp=2024-04-17T18:49:18.735, value=Student80
80 column=details:lastName, timestamp=2024-04-17T20:02:14.625, value=LastName80_Modified
81 column=details:firstName, timestamp=2024-04-17T18:49:18.747, value=Student81
81 column=details:lastName, timestamp=2024-04-17T20:02:14.630, value=LastName81_Modified
82 column=details:firstName, timestamp=2024-04-17T18:49:18.765, value=Student82
82 column=details:lastName, timestamp=2024-04-17T20:02:14.633, value=LastName82_Modified
83 column=details:firstName, timestamp=2024-04-17T18:49:18.779, value=Student83
83 column=details:lastName, timestamp=2024-04-17T20:02:14.636, value=LastName83_Modified
84 column=details:firstName, timestamp=2024-04-17T18:49:18.789, value=Student84
84 column=details:lastName, timestamp=2024-04-17T20:02:14.640, value=LastName84_Modified
85 column=details:firstName, timestamp=2024-04-17T18:49:18.800, value=Student85
85 column=details:lastName, timestamp=2024-04-17T20:02:14.643, value=LastName85_Modified
86 column=details:firstName, timestamp=2024-04-17T18:49:18.813, value=Student86
86 column=details:lastName, timestamp=2024-04-17T20:02:14.646, value=LastName86_Modified
87 column=details:firstName, timestamp=2024-04-17T18:49:18.825, value=Student87
87 column=details:lastName, timestamp=2024-04-17T20:02:14.649, value=LastName87_Modified
88 column=details:firstName, timestamp=2024-04-17T18:49:18.838, value=Student88
88 column=details:lastName, timestamp=2024-04-17T20:02:14.653, value=LastName88_Modified
89 column=details:firstName, timestamp=2024-04-17T18:49:18.848, value=Student89
89 column=details:lastName, timestamp=2024-04-17T20:02:14.657, value=LastName89_Modified
9 column=details:firstName, timestamp=2024-04-17T19:14:58.631, value=Scholar9
9 column=details:lastName, timestamp=2024-04-17T18:49:17.864, value=LastName9
89 row(s)
Took 0.3016 seconds
hbase(main):048:0> █
```

5. Data Retrieval: After all modifications, retrieve and display the details for students with IDs 40, 60, 80, and 90 to verify changes.

Code:

```
[40, 60, 80, 90].each do |id|
  get 'students', "#{id}"
end
```

```

hbase(main):049:0> [40, 60, 80, 90].each do |id|
hbase(main):050:1*   get 'students', "#{id}"
hbase(main):051:1> end
COLUMN                                CELL
  details:firstName                  timestamp=2024-04-17T19:14:58.783, value=Scholar40
  details:lastName                   timestamp=2024-04-17T18:49:18.318, value=LastName40
1 row(s)
Took 0.0777 seconds
COLUMN                                CELL
  details:firstName                  timestamp=2024-04-17T18:49:18.547, value=Student60
  details:lastName                   timestamp=2024-04-17T18:49:18.552, value=LastName60
  details:middleName                timestamp=2024-04-17T19:28:45.788, value=MidName60
1 row(s)
Took 0.0161 seconds
COLUMN                                CELL
  details:firstName                  timestamp=2024-04-17T18:49:18.735, value=Student80
  details:lastName                   timestamp=2024-04-17T20:02:14.625, value=LastName80_Modified
1 row(s)
Took 0.0109 seconds
COLUMN                                CELL
0 row(s)
Took 0.0064 seconds
=> [40, 60, 80, 90]
hbase(main):052:0> █

```