

## Table Creation and Management Exercise

Exercise 1: Create a table named 'students' with a column family 'details'

Exercise 2: Verify that the table has been created.

```
See https://ubuntu.com/esm or run: sudo pro status
New release '22.04.3 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Fri Jan 19 05:25:52 2024 from 172.59.79.3
chitramoy@bigdata1:~$ ls -ltr
total 4
drwxrwxr-x 4 chitramoy chitramoy 4096 Dec  5 01:26 dsc650-infra
chitramoy@bigdata1:~$ cd dsc650-infra
chitramoy@bigdata1:~/dsc650-infra$ cd bellevue-bigdata
chitramoy@bigdata1:~/dsc650-infra/bellevue-bigdata$ cd hadoop-hive-spark-hbase
chitramoy@bigdata1:~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase$ sudo docker-compose up -d
Starting hadoop-hive-spark-hbase_hivemetastore_1 ...
hadoop-hive-spark-hbase_zoo3_1 is up-to-date
hadoop-hive-spark-hbase_zoo1_1 is up-to-date
Starting hadoop-hive-spark-hbase_hivemetastore_1 ... done
Starting hadoop-hive-spark-hbase_master_1 ... done
Starting hadoop-hive-spark-hbase_worker2_1 ... done
Starting hadoop-hive-spark-hbase_worker1_1 ... done
chitramoy@bigdata1:~/dsc650-infra/bellevue-bigdata/hadoop-hive-spark-hbase$ sudo docker-compose exec master bash
bash-5.0# hbase shell
2024-01-19 05:48:55,904 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HBase Shell
Use "help" to get list of supported commands.
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 0.0039 seconds
hbase(main):001:0> create 'students', 'details'
ERROR: KeeperErrorCode = NoNode for /hbase/master
For usage try 'help "create"'

Took 0.2188 seconds
hbase(main):002:0> create 'students', 'details'
Created table students
Took 2.9337 seconds
=> Hbases:Table - students
hbase(main):003:0> list
TABLE
students
1 row(s)
Took 0.0328 seconds
=> ["students"]
hbase(main):004:0>
hbase(main):004:0> █
```

Exercise 3: Add data to the 'students' table. Let's assume each student has a unique ID, a first name, and a last name.

Exercise 4: Query the data from the 'students' table to retrieve the details of the student with ID '1'.

```
=> ["students"]
hbase(main):004:0> put 'students', '1', 'details:firstName', 'John'
Took 0.2926 seconds
hbase(main):005:0> put 'students', '1', 'details:lastName', 'Doe'
Took 0.0072 seconds
hbase(main):006:0> get 'students', '1'
COLUMN                                CELL
details:firstName                      timestamp=2024-01-19T05:53:32.162, value=John
details:lastName                      timestamp=2024-01-19T05:53:35.467, value=Doe
1 row(s)
Took 0.0846 seconds
hbase(main):007:0> █
```

Exercise 5: Create a table named 'orders' to store data about customer orders. Assume each order is uniquely identified by a composite key formed by combining the customer ID and order date (in the format YYYYMMDD).

Exercise 6: Add sample data to the 'orders' table using the composite key:

Exercise 7: Query the 'orders' table to retrieve details of all orders placed by the customer with ID '101'.

```

hbase(main):007:0> create 'orders', 'orderDetails'
Created table orders
Took 1.1753 seconds
=> Hbase::Table - orders
hbase(main):008:0> put 'orders', '101:20230806', 'orderDetails:item', 'Laptop'
Took 0.0282 seconds
hbase(main):009:0> put 'orders', '102:20230806', 'orderDetails:item', 'Smartphone'
Took 0.0080 seconds
hbase(main):010:0> scan 'orders', {STARTROW => '101:', ENDROW => '101:~'}
ROW                                COLUMN+CELL
101:20230806                        column=orderDetails:item, timestamp=2024-01-19T05:57:21.893, value=Laptop
1 row(s)
Took 0.0239 seconds
hbase(main):011:0> █

```

Exercise 8: Generate random data for the 'students' table.

```

2024-01-20 04:30:43,077 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
HBase Shell
Use "help" to get list of supported commands.
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 0.0070 seconds
hbase(main):001:0> (2..100).each do |i|
hbase(main):002:1* first_name = "Student#{i}"
hbase(main):003:1> last_name = "LastName#{i}"
hbase(main):004:1> put 'students', "#{i}", 'details:firstName', first_name
hbase(main):005:1> put 'students', "#{i}", 'details:lastName', last_name
hbase(main):006:1> end
Took 0.8764 seconds
Took 0.0084 seconds
Took 0.0121 seconds
Took 0.0095 seconds
Took 0.0082 seconds
Took 0.0080 seconds
Took 0.0088 seconds
Took 0.0094 seconds
Took 0.0082 seconds
Took 0.0080 seconds
Took 0.0106 seconds
Took 0.0081 seconds
Took 0.0117 seconds
Took 0.0136 seconds
Took 0.0114 seconds
Took 0.0095 seconds
Took 0.0086 seconds
Took 0.0088 seconds
Took 0.0100 seconds
Took 0.0070 seconds
Took 0.0090 seconds
Took 0.0082 seconds
Took 0.0078 seconds
Took 0.0094 seconds
Took 0.0085 seconds
Took 0.0073 seconds
Took 0.0086 seconds
Took 0.0069 seconds
Took 0.0069 seconds
Took 0.0061 seconds
Took 0.0086 seconds
Took 0.0075 seconds
Took 0.0069 seconds
Took 0.0071 seconds
Took 0.0066 seconds

```



```

Took 0.0075 seconds
Took 0.0054 seconds
Took 0.0051 seconds
Took 0.0047 seconds
Took 0.0049 seconds
Took 0.0060 seconds
Took 0.0052 seconds
Took 0.0066 seconds
Took 0.0051 seconds
Took 0.0062 seconds
Took 0.0047 seconds
Took 0.0056 seconds
Took 0.0048 seconds
Took 0.0050 seconds
Took 0.0060 seconds
Took 0.0049 seconds
Took 0.0053 seconds
Took 0.0050 seconds
Took 0.0062 seconds
Took 0.0064 seconds
Took 0.0040 seconds
Took 0.0071 seconds
Took 0.0042 seconds
Took 0.0047 seconds
Took 0.0041 seconds
Took 0.0036 seconds
Took 0.0050 seconds
Took 0.0039 seconds
Took 0.0036 seconds
Took 0.0049 seconds
Took 0.0114 seconds
Took 0.0053 seconds
Took 0.0049 seconds
Took 0.0046 seconds
Took 0.0049 seconds
Took 0.0047 seconds
Took 0.0058 seconds
Took 0.0045 seconds
Took 0.0065 seconds
Took 0.0054 seconds
Took 0.0055 seconds
Took 0.0071 seconds
Took 0.0063 seconds
Took 0.0052 seconds
Took 0.0041 seconds
Took 0.0035 seconds
Took 0.0034 seconds
=> 2.100
hbase(main):007:0> █

```

Exercise 9: Scan the 'students' table to verify data insertion.

```

=> 2.100
hbase(main):007:0> scan 'students'
COLUMN+CELL
1      column=details:firstName, timestamp=2024-01-19T05:53:32.162, value=John
1      column=details:lastName, timestamp=2024-01-19T05:53:35.467, value=Doe
10     column=details:firstName, timestamp=2024-01-20T04:34:50.985, value=Student10
10     column=details:lastName, timestamp=2024-01-20T04:34:50.995, value=LastName10
100    column=details:firstName, timestamp=2024-01-20T04:34:52.433, value=Student100
100    column=details:lastName, timestamp=2024-01-20T04:34:52.437, value=LastName100
11     column=details:firstName, timestamp=2024-01-20T04:34:51.006, value=Student11
11     column=details:lastName, timestamp=2024-01-20T04:34:51.017, value=LastName11
12     column=details:firstName, timestamp=2024-01-20T04:34:51.028, value=Student12
12     column=details:lastName, timestamp=2024-01-20T04:34:51.037, value=LastName12
13     column=details:firstName, timestamp=2024-01-20T04:34:51.047, value=Student13
13     column=details:lastName, timestamp=2024-01-20T04:34:51.057, value=LastName13
14     column=details:firstName, timestamp=2024-01-20T04:34:51.067, value=Student14
14     column=details:lastName, timestamp=2024-01-20T04:34:51.077, value=LastName14
15     column=details:firstName, timestamp=2024-01-20T04:34:51.085, value=Student15
15     column=details:lastName, timestamp=2024-01-20T04:34:51.096, value=LastName15
16     column=details:firstName, timestamp=2024-01-20T04:34:51.103, value=Student16
16     column=details:lastName, timestamp=2024-01-20T04:34:51.111, value=LastName16
17     column=details:firstName, timestamp=2024-01-20T04:34:51.120, value=Student17
17     column=details:lastName, timestamp=2024-01-20T04:34:51.129, value=LastName17
18     column=details:firstName, timestamp=2024-01-20T04:34:51.138, value=Student18
18     column=details:lastName, timestamp=2024-01-20T04:34:51.147, value=LastName18
19     column=details:firstName, timestamp=2024-01-20T04:34:51.154, value=Student19
19     column=details:lastName, timestamp=2024-01-20T04:34:51.163, value=LastName19
2      column=details:firstName, timestamp=2024-01-20T04:34:50.784, value=Student2
2      column=details:lastName, timestamp=2024-01-20T04:34:50.807, value=LastName2
20     column=details:firstName, timestamp=2024-01-20T04:34:51.170, value=Student20
20     column=details:lastName, timestamp=2024-01-20T04:34:51.180, value=LastName20
21     column=details:firstName, timestamp=2024-01-20T04:34:51.189, value=Student21
21     column=details:lastName, timestamp=2024-01-20T04:34:51.198, value=LastName21
22     column=details:firstName, timestamp=2024-01-20T04:34:51.207, value=Student22
22     column=details:lastName, timestamp=2024-01-20T04:34:51.217, value=LastName22
23     column=details:firstName, timestamp=2024-01-20T04:34:51.226, value=Student23
23     column=details:lastName, timestamp=2024-01-20T04:34:51.233, value=LastName23
24     column=details:firstName, timestamp=2024-01-20T04:34:51.241, value=Student24
24     column=details:lastName, timestamp=2024-01-20T04:34:51.248, value=LastName24
25     column=details:firstName, timestamp=2024-01-20T04:34:51.258, value=Student25
25     column=details:lastName, timestamp=2024-01-20T04:34:51.274, value=LastName25
26     column=details:firstName, timestamp=2024-01-20T04:34:51.281, value=Student26
26     column=details:lastName, timestamp=2024-01-20T04:34:51.303, value=LastName26
27     column=details:firstName, timestamp=2024-01-20T04:34:51.315, value=Student27
27     column=details:lastName, timestamp=2024-01-20T04:34:51.331, value=LastName27
28     column=details:firstName, timestamp=2024-01-20T04:34:51.361, value=Student28
28     column=details:lastName, timestamp=2024-01-20T04:34:51.371, value=LastName28
29     column=details:firstName, timestamp=2024-01-20T04:34:51.385, value=Student29
29     column=details:lastName, timestamp=2024-01-20T04:34:51.401, value=LastName29

```

```

79      column=details:firstName, timestamp=2024-01-20T04:34:52.149, value=Student79
79      column=details:lastName, timestamp=2024-01-20T04:34:52.155, value=LastName79
8      column=details:firstName, timestamp=2024-01-20T04:34:50.927, value=Student8
8      column=details:lastName, timestamp=2024-01-20T04:34:50.946, value=LastName8
80     column=details:firstName, timestamp=2024-01-20T04:34:52.163, value=Student80
80     column=details:lastName, timestamp=2024-01-20T04:34:52.170, value=LastName80
81     column=details:firstName, timestamp=2024-01-20T04:34:52.177, value=Student81
81     column=details:lastName, timestamp=2024-01-20T04:34:52.185, value=LastName81
82     column=details:firstName, timestamp=2024-01-20T04:34:52.192, value=Student82
82     column=details:lastName, timestamp=2024-01-20T04:34:52.198, value=LastName82
83     column=details:firstName, timestamp=2024-01-20T04:34:52.205, value=Student83
83     column=details:lastName, timestamp=2024-01-20T04:34:52.211, value=LastName83
84     column=details:firstName, timestamp=2024-01-20T04:34:52.217, value=Student84
84     column=details:lastName, timestamp=2024-01-20T04:34:52.224, value=LastName84
85     column=details:firstName, timestamp=2024-01-20T04:34:52.230, value=Student85
85     column=details:lastName, timestamp=2024-01-20T04:34:52.236, value=LastName85
86     column=details:firstName, timestamp=2024-01-20T04:34:52.242, value=Student86
86     column=details:lastName, timestamp=2024-01-20T04:34:52.249, value=LastName86
87     column=details:firstName, timestamp=2024-01-20T04:34:52.256, value=Student87
87     column=details:lastName, timestamp=2024-01-20T04:34:52.262, value=LastName87
88     column=details:firstName, timestamp=2024-01-20T04:34:52.268, value=Student88
88     column=details:lastName, timestamp=2024-01-20T04:34:52.275, value=LastName88
89     column=details:firstName, timestamp=2024-01-20T04:34:52.281, value=Student89
89     column=details:lastName, timestamp=2024-01-20T04:34:52.286, value=LastName89
9      column=details:firstName, timestamp=2024-01-20T04:34:50.959, value=Student9
9      column=details:lastName, timestamp=2024-01-20T04:34:50.974, value=LastName9
90     column=details:firstName, timestamp=2024-01-20T04:34:52.290, value=Student90
90     column=details:lastName, timestamp=2024-01-20T04:34:52.300, value=LastName90
91     column=details:firstName, timestamp=2024-01-20T04:34:52.307, value=Student91
91     column=details:lastName, timestamp=2024-01-20T04:34:52.312, value=LastName91
92     column=details:firstName, timestamp=2024-01-20T04:34:52.317, value=Student92
92     column=details:lastName, timestamp=2024-01-20T04:34:52.323, value=LastName92
93     column=details:firstName, timestamp=2024-01-20T04:34:52.337, value=Student93
93     column=details:lastName, timestamp=2024-01-20T04:34:52.344, value=LastName93
94     column=details:firstName, timestamp=2024-01-20T04:34:52.351, value=Student94
94     column=details:lastName, timestamp=2024-01-20T04:34:52.361, value=LastName94
95     column=details:firstName, timestamp=2024-01-20T04:34:52.367, value=Student95
95     column=details:lastName, timestamp=2024-01-20T04:34:52.375, value=LastName95
96     column=details:firstName, timestamp=2024-01-20T04:34:52.381, value=Student96
96     column=details:lastName, timestamp=2024-01-20T04:34:52.389, value=LastName96
97     column=details:firstName, timestamp=2024-01-20T04:34:52.396, value=Student97
97     column=details:lastName, timestamp=2024-01-20T04:34:52.401, value=LastName97
98     column=details:firstName, timestamp=2024-01-20T04:34:52.408, value=Student98
98     column=details:lastName, timestamp=2024-01-20T04:34:52.416, value=LastName98
99     column=details:firstName, timestamp=2024-01-20T04:34:52.423, value=Student99
99     column=details:lastName, timestamp=2024-01-20T04:34:52.428, value=LastName99
100 row(s)
Took 0.3457 seconds
hbase(main):008:0>

```

## Exercise 10: HBase Data Manipulation

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.

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

first\_name = "Scholar#{i}"

put 'students', "#{i}", 'details:firstName', first\_name

end

```

Took 0.6720 seconds
hbase(main):003:0> (2.50).each do |i|
hbase(main):004:1* first_name = "Scholar#{i}"
hbase(main):005:1> put 'students', "#{i}", 'details:firstName', first_name
hbase(main):006:1> end
Took 0.0514 seconds
Took 0.0064 seconds
Took 0.0059 seconds
Took 0.0058 seconds
Took 0.0072 seconds
Took 0.0070 seconds
Took 0.0057 seconds
Took 0.0065 seconds
Took 0.0101 seconds
Took 0.0078 seconds
Took 0.0093 seconds
Took 0.0069 seconds
Took 0.0057 seconds
Took 0.0093 seconds
Took 0.0061 seconds
Took 0.0091 seconds
Took 0.0062 seconds
Took 0.0073 seconds
Took 0.0061 seconds
Took 0.0053 seconds
Took 0.0055 seconds
Took 0.0056 seconds
Took 0.0063 seconds
Took 0.0066 seconds
Took 0.0069 seconds
Took 0.0062 seconds
Took 0.0067 seconds
Took 0.0062 seconds
Took 0.0063 seconds
Took 0.0069 seconds
Took 0.0062 seconds
Took 0.0050 seconds
Took 0.0058 seconds
Took 0.0061 seconds
Took 0.0058 seconds
Took 0.0071 seconds
Took 0.0053 seconds
Took 0.0053 seconds

```

```

Took 0.0100 seconds
Took 0.0044 seconds
Took 0.0061 seconds
Took 0.0051 seconds
Took 0.0048 seconds
Took 0.0047 seconds
Took 0.0047 seconds
Took 0.0048 seconds
=> 2.50
hbase(main):007:0> scan "students"

ROW                                COLUMN+CELL
1                                  column=details:firstName, timestamp=2024-01-19T05:53:32.162, value=John
1                                  column=details:lastName, timestamp=2024-01-19T05:53:35.467, value=Doe
10                                 column=details:firstName, timestamp=2024-01-20T13:39:59.187, value=Scholar10
10                                 column=details:lastName, timestamp=2024-01-20T04:34:50.995, value=LastName10
100                                column=details:firstName, timestamp=2024-01-20T04:34:52.433, value=Student100
100                                column=details:lastName, timestamp=2024-01-20T04:34:52.437, value=LastName100
11                                 column=details:firstName, timestamp=2024-01-20T13:39:59.198, value=Scholar11
11                                 column=details:lastName, timestamp=2024-01-20T04:34:51.017, value=LastName11
12                                 column=details:firstName, timestamp=2024-01-20T13:39:59.206, value=Scholar12
12                                 column=details:lastName, timestamp=2024-01-20T04:34:51.037, value=LastName12
13                                 column=details:firstName, timestamp=2024-01-20T13:39:59.218, value=Scholar13
13                                 column=details:lastName, timestamp=2024-01-20T04:34:51.057, value=LastName13
14                                 column=details:firstName, timestamp=2024-01-20T13:39:59.227, value=Scholar14
14                                 column=details:lastName, timestamp=2024-01-20T04:34:51.077, value=LastName14
15                                 column=details:firstName, timestamp=2024-01-20T13:39:59.236, value=Scholar15
15                                 column=details:lastName, timestamp=2024-01-20T04:34:51.096, value=LastName15
16                                 column=details:firstName, timestamp=2024-01-20T13:39:59.247, value=Scholar16
16                                 column=details:lastName, timestamp=2024-01-20T04:34:51.111, value=LastName16
17                                 column=details:firstName, timestamp=2024-01-20T13:39:59.258, value=Scholar17
17                                 column=details:lastName, timestamp=2024-01-20T04:34:51.129, value=LastName17
18                                 column=details:firstName, timestamp=2024-01-20T13:39:59.266, value=Scholar18
18                                 column=details:lastName, timestamp=2024-01-20T04:34:51.147, value=LastName18
19                                 column=details:firstName, timestamp=2024-01-20T13:39:59.275, value=Scholar19
19                                 column=details:lastName, timestamp=2024-01-20T04:34:51.163, value=LastName19
2                                  column=details:firstName, timestamp=2024-01-20T13:39:59.105, value=Scholar2
2                                  column=details:lastName, timestamp=2024-01-20T04:34:50.807, value=LastName2
20                                 column=details:firstName, timestamp=2024-01-20T13:39:59.283, value=Scholar20
20                                 column=details:lastName, timestamp=2024-01-20T04:34:51.180, value=LastName20
21                                 column=details:firstName, timestamp=2024-01-20T13:39:59.289, value=Scholar21
21                                 column=details:lastName, timestamp=2024-01-20T04:34:51.198, value=LastName21
22                                 column=details:firstName, timestamp=2024-01-20T13:39:59.297, value=Scholar22
22                                 column=details:lastName, timestamp=2024-01-20T04:34:51.217, value=LastName22
23                                 column=details:firstName, timestamp=2024-01-20T13:39:59.304, value=Scholar23
23                                 column=details:lastName, timestamp=2024-01-20T04:34:51.233, value=LastName23
24                                 column=details:firstName, timestamp=2024-01-20T13:39:59.311, value=Scholar24
24                                 column=details:lastName, timestamp=2024-01-20T04:34:51.248, value=LastName24
25                                 column=details:firstName, timestamp=2024-01-20T13:39:59.319, value=Scholar25
25                                 column=details:lastName, timestamp=2024-01-20T04:34:51.274, value=LastName25

```

## Exercise 10: HBase Data Manipulation

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}.

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

```
  Mid_name = "MidName#{i}"
```

```
  put 'students', "#{i}", 'details:MidName', Mid_name
```



end

```
hbase(main):001:0> (51..75).each do |i|
hbase(main):002:1* Mid_name = "MidName#{i}"
hbase(main):003:1> put 'students', "#{i}", 'details:MidName', Mid_name
hbase(main):004:1> end
Took 1.1263 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0082 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0075 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0068 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0057 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0063 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0055 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0058 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0080 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0049 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0048 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0070 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0044 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0085 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0059 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0073 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0067 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0061 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0084 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0105 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0137 seconds
(hbase):2: warning: already initialized constant Mid_name
Took 0.0068 seconds
(hbase):2: warning: already initialized constant Mid_name
```

```
5 column=details:firstName, timestamp=2024-01-20T013:39:59.141, value=Scholar5
5 column=details:lastName, timestamp=2024-01-20T04:34:50.874, value=LastName5
50 column=details:firstName, timestamp=2024-01-20T013:39:59.510, value=Scholar50
50 column=details:lastName, timestamp=2024-01-20T04:34:51.757, value=LastName50
51 column=details:MidName, timestamp=2024-01-20T013:54:11.128, value=MidName51
51 column=details:firstName, timestamp=2024-01-20T04:34:51.764, value=Student51
51 column=details:lastName, timestamp=2024-01-20T04:34:51.770, value=LastName51
52 column=details:MidName, timestamp=2024-01-20T013:54:11.156, value=MidName52
52 column=details:firstName, timestamp=2024-01-20T04:34:51.777, value=Student52
52 column=details:lastName, timestamp=2024-01-20T04:34:51.782, value=LastName52
53 column=details:MidName, timestamp=2024-01-20T013:54:11.164, value=MidName53
53 column=details:firstName, timestamp=2024-01-20T04:34:51.788, value=Student53
53 column=details:lastName, timestamp=2024-01-20T04:34:51.795, value=LastName53
54 column=details:MidName, timestamp=2024-01-20T013:54:11.177, value=MidName54
54 column=details:firstName, timestamp=2024-01-20T04:34:51.802, value=Student54
54 column=details:lastName, timestamp=2024-01-20T04:34:51.815, value=LastName54
55 column=details:MidName, timestamp=2024-01-20T013:54:11.186, value=MidName55
55 column=details:firstName, timestamp=2024-01-20T04:34:51.823, value=Student55
55 column=details:lastName, timestamp=2024-01-20T04:34:51.829, value=LastName55
56 column=details:MidName, timestamp=2024-01-20T013:54:11.194, value=MidName56
56 column=details:firstName, timestamp=2024-01-20T04:34:51.836, value=Student56
56 column=details:lastName, timestamp=2024-01-20T04:34:51.846, value=LastName56
57 column=details:MidName, timestamp=2024-01-20T013:54:11.204, value=MidName57
57 column=details:firstName, timestamp=2024-01-20T04:34:51.854, value=Student57
57 column=details:lastName, timestamp=2024-01-20T04:34:51.861, value=LastName57
58 column=details:MidName, timestamp=2024-01-20T013:54:11.213, value=MidName58
58 column=details:firstName, timestamp=2024-01-20T04:34:51.868, value=Student58
58 column=details:lastName, timestamp=2024-01-20T04:34:51.875, value=LastName58
59 column=details:MidName, timestamp=2024-01-20T013:54:11.225, value=MidName59
59 column=details:firstName, timestamp=2024-01-20T04:34:51.882, value=Student59
59 column=details:lastName, timestamp=2024-01-20T04:34:51.888, value=LastName59
6 column=details:firstName, timestamp=2024-01-20T013:39:59.148, value=Scholar6
60 column=details:lastName, timestamp=2024-01-20T04:34:50.894, value=LastName60
60 column=details:MidName, timestamp=2024-01-20T013:54:11.234, value=MidName60
60 column=details:firstName, timestamp=2024-01-20T04:34:51.894, value=Student60
60 column=details:lastName, timestamp=2024-01-20T04:34:51.900, value=LastName60
61 column=details:MidName, timestamp=2024-01-20T013:54:11.241, value=MidName61
61 column=details:firstName, timestamp=2024-01-20T04:34:51.905, value=Student61
61 column=details:lastName, timestamp=2024-01-20T04:34:51.912, value=LastName61
62 column=details:MidName, timestamp=2024-01-20T013:54:11.250, value=MidName62
62 column=details:firstName, timestamp=2024-01-20T04:34:51.918, value=Student62
62 column=details:lastName, timestamp=2024-01-20T04:34:51.926, value=LastName62
63 column=details:MidName, timestamp=2024-01-20T013:54:11.258, value=MidName63
63 column=details:firstName, timestamp=2024-01-20T04:34:51.932, value=Student63
63 column=details:lastName, timestamp=2024-01-20T04:34:51.938, value=LastName63
64 column=details:MidName, timestamp=2024-01-20T013:54:11.265, value=MidName64
64 column=details:firstName, timestamp=2024-01-20T04:34:51.944, value=Student64
64 column=details:lastName, timestamp=2024-01-20T04:34:51.955, value=LastName64
65 column=details:MidName, timestamp=2024-01-20T013:54:11.278, value=MidName65
```

## Exercise 10: HBase Data Manipulation

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

```
(76..100).each do |i|
```

```
  last_name = "LastName#{i}_Modified"
```

```
  put 'students', "#{i}", 'details:lastName', last_name
```

```
end
```

```
100 row(s)
Took 0.2383 seconds
hbase(main):119:0> (76..100).each do |i|
hbase(main):120:1* last_name = "LastName#{i}_Modified"
hbase(main):121:1> put 'students', "#{i}", 'details:lastName', last_name
hbase(main):122:1> end
Took 0.0123 seconds
Took 0.0066 seconds
Took 0.0050 seconds
Took 0.0060 seconds
Took 0.0056 seconds
Took 0.0047 seconds
Took 0.0045 seconds
Took 0.0050 seconds
Took 0.0053 seconds
Took 0.0075 seconds
Took 0.0051 seconds
Took 0.0056 seconds
Took 0.0051 seconds
Took 0.0052 seconds
Took 0.0097 seconds
Took 0.0069 seconds
Took 0.0052 seconds
Took 0.0052 seconds
Took 0.0060 seconds
Took 0.0055 seconds
Took 0.0047 seconds
Took 0.0053 seconds
Took 0.0057 seconds
Took 0.0049 seconds
Took 0.0048 seconds
=> 76..100
hbase(main):123:0> scan "students"
ROW COLUMN+CELL
1 column=details:firstName, timestamp=2024-01-19T05:53:32.162, value=John
1 column=details:lastName, timestamp=2024-01-19T05:53:35.467, value=Doe
10 column=details:firstName, timestamp=2024-01-20T13:39:59.187, value=Scholar10
10 column=details:lastName, timestamp=2024-01-20T04:34:50.995, value=LastName10
100 column=details:firstName, timestamp=2024-01-20T04:34:52.433, value=Student100
100 column=details:lastName, timestamp=2024-01-20T14:46:28.676, value=LastName100_Modified
11 column=details:firstName, timestamp=2024-01-20T13:39:59.190, value=Scholar11
11 column=details:lastName, timestamp=2024-01-20T04:34:51.017, value=LastName11
12 column=details:firstName, timestamp=2024-01-20T13:39:59.206, value=Scholar12
12 column=details:lastName, timestamp=2024-01-20T04:34:51.037, value=LastName12
13 column=details:firstName, timestamp=2024-01-20T13:39:59.210, value=Scholar13
13 column=details:lastName, timestamp=2024-01-20T04:34:51.057, value=LastName13
14 column=details:firstName, timestamp=2024-01-20T13:39:59.227, value=Scholar14
14 column=details:lastName, timestamp=2024-01-20T04:34:51.077, value=LastName14
15 column=details:firstName, timestamp=2024-01-20T13:39:59.236, value=Scholar15
```

```

77 column=details:firstName, timestamp=2024-01-20T04:34:52.120, value=Student77
77 column=details:lastName, timestamp=2024-01-20T14:46:28.518, value=LastName77_Modified
78 column=details:firstName, timestamp=2024-01-20T04:34:52.136, value=Student78
78 column=details:lastName, timestamp=2024-01-20T14:46:28.524, value=LastName78_Modified
79 column=details:firstName, timestamp=2024-01-20T04:34:52.149, value=Student79
79 column=details:lastName, timestamp=2024-01-20T14:46:28.531, value=LastName79_Modified
8 column=details:firstName, timestamp=2024-01-20T13:39:59.166, value=Scholar8
8 column=details:lastName, timestamp=2024-01-20T04:34:50.946, value=LastName8
80 column=details:firstName, timestamp=2024-01-20T04:34:52.163, value=Student80
80 column=details:lastName, timestamp=2024-01-20T14:46:28.539, value=LastName80_Modified
81 column=details:firstName, timestamp=2024-01-20T04:34:52.177, value=Student81
81 column=details:lastName, timestamp=2024-01-20T14:46:28.544, value=LastName81_Modified
82 column=details:firstName, timestamp=2024-01-20T04:34:52.192, value=Student82
82 column=details:lastName, timestamp=2024-01-20T14:46:28.550, value=LastName82_Modified
83 column=details:firstName, timestamp=2024-01-20T04:34:52.205, value=Student83
83 column=details:lastName, timestamp=2024-01-20T14:46:28.556, value=LastName83_Modified
84 column=details:firstName, timestamp=2024-01-20T04:34:52.217, value=Student84
84 column=details:lastName, timestamp=2024-01-20T14:46:28.563, value=LastName84_Modified
85 column=details:firstName, timestamp=2024-01-20T04:34:52.230, value=Student85
85 column=details:lastName, timestamp=2024-01-20T14:46:28.570, value=LastName85_Modified
86 column=details:firstName, timestamp=2024-01-20T04:34:52.242, value=Student86
86 column=details:lastName, timestamp=2024-01-20T14:46:28.578, value=LastName86_Modified
87 column=details:firstName, timestamp=2024-01-20T04:34:52.256, value=Student87
87 column=details:lastName, timestamp=2024-01-20T14:46:28.585, value=LastName87_Modified
88 column=details:firstName, timestamp=2024-01-20T04:34:52.268, value=Student88
88 column=details:lastName, timestamp=2024-01-20T14:46:28.592, value=LastName88_Modified
89 column=details:firstName, timestamp=2024-01-20T04:34:52.281, value=Student89
89 column=details:lastName, timestamp=2024-01-20T14:46:28.598, value=LastName89_Modified
9 column=details:firstName, timestamp=2024-01-20T13:39:59.174, value=Scholar9
9 column=details:lastName, timestamp=2024-01-20T04:34:50.974, value=LastName9
90 column=details:firstName, timestamp=2024-01-20T04:34:52.230, value=Student90
90 column=details:lastName, timestamp=2024-01-20T14:46:28.610, value=LastName90_Modified
91 column=details:firstName, timestamp=2024-01-20T04:34:52.307, value=Student91
91 column=details:lastName, timestamp=2024-01-20T14:46:28.617, value=LastName91_Modified
92 column=details:firstName, timestamp=2024-01-20T04:34:52.317, value=Student92
92 column=details:lastName, timestamp=2024-01-20T14:46:28.624, value=LastName92_Modified
93 column=details:firstName, timestamp=2024-01-20T04:34:52.337, value=Student93
93 column=details:lastName, timestamp=2024-01-20T14:46:28.631, value=LastName93_Modified
94 column=details:firstName, timestamp=2024-01-20T04:34:52.351, value=Student94
94 column=details:lastName, timestamp=2024-01-20T14:46:28.638, value=LastName94_Modified
95 column=details:firstName, timestamp=2024-01-20T04:34:52.367, value=Student95
95 column=details:lastName, timestamp=2024-01-20T14:46:28.644, value=LastName95_Modified
96 column=details:firstName, timestamp=2024-01-20T04:34:52.381, value=Student96
96 column=details:lastName, timestamp=2024-01-20T14:46:28.650, value=LastName96_Modified
97 column=details:firstName, timestamp=2024-01-20T04:34:52.396, value=Student97
97 column=details:lastName, timestamp=2024-01-20T14:46:28.657, value=LastName97_Modified
98 column=details:firstName, timestamp=2024-01-20T04:34:52.408, value=Student98
98 column=details:lastName, timestamp=2024-01-20T14:46:28.663, value=LastName98_Modified
99 column=details:firstName, timestamp=2024-01-20T04:34:52.423, value=Student99

```

## Exercise 10: HBase Data Manipulation

Delete all the details for students with IDs from 90 to 100

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

deleteall 'students', "#{i}"

end

```

hbase(main):1187:0> (90..100).each do |i|
hbase(main):1188:1> deleteall 'students', "#{i}"
hbase(main):1189:1> end
Took 0.0112 seconds
Took 0.0048 seconds
Took 0.0040 seconds
Took 0.0052 seconds
Took 0.0035 seconds
Took 0.0032 seconds
Took 0.0037 seconds
Took 0.0037 seconds
Took 0.0036 seconds
Took 0.0049 seconds
Took 0.0042 seconds
<- 90..100
hbase(main):1190:0> scan "students"
ROW COLUMN+CELL
1 column=details:firstName, timestamp=2024-01-19T05:53:32.162, value=John
1 column=details:lastName, timestamp=2024-01-19T05:53:35.467, value=Doe
10 column=details:firstName, timestamp=2024-01-20T13:39:59.187, value=Scholar10
10 column=details:lastName, timestamp=2024-01-20T04:34:50.995, value=LastName10
11 column=details:firstName, timestamp=2024-01-20T13:39:59.198, value=Scholar11
11 column=details:lastName, timestamp=2024-01-20T04:34:51.017, value=LastName11
12 column=details:firstName, timestamp=2024-01-20T13:39:59.206, value=Scholar12
12 column=details:lastName, timestamp=2024-01-20T04:34:51.037, value=LastName12
13 column=details:firstName, timestamp=2024-01-20T13:39:59.218, value=Scholar13
13 column=details:lastName, timestamp=2024-01-20T04:34:51.057, value=LastName13
14 column=details:firstName, timestamp=2024-01-20T13:39:59.227, value=Scholar14
14 column=details:lastName, timestamp=2024-01-20T04:34:51.077, value=LastName14
15 column=details:firstName, timestamp=2024-01-20T13:39:59.236, value=Scholar15
15 column=details:lastName, timestamp=2024-01-20T04:34:51.096, value=LastName15
16 column=details:firstName, timestamp=2024-01-20T13:39:59.247, value=Scholar16
16 column=details:lastName, timestamp=2024-01-20T04:34:51.111, value=LastName16
17 column=details:firstName, timestamp=2024-01-20T13:39:59.258, value=Scholar17
17 column=details:lastName, timestamp=2024-01-20T04:34:51.129, value=LastName17
18 column=details:firstName, timestamp=2024-01-20T13:39:59.266, value=Scholar18
18 column=details:lastName, timestamp=2024-01-20T04:34:51.147, value=LastName18
19 column=details:firstName, timestamp=2024-01-20T13:39:59.275, value=Scholar19
19 column=details:lastName, timestamp=2024-01-20T04:34:51.163, value=LastName19
2 column=details:firstName, timestamp=2024-01-20T13:39:59.105, value=Scholar2
2 column=details:lastName, timestamp=2024-01-20T04:34:50.807, value=LastName2
20 column=details:firstName, timestamp=2024-01-20T13:39:59.283, value=Scholar20
20 column=details:lastName, timestamp=2024-01-20T04:34:51.180, value=LastName20
21 column=details:firstName, timestamp=2024-01-20T13:39:59.289, value=Scholar21
21 column=details:lastName, timestamp=2024-01-20T04:34:51.198, value=LastName21
22 column=details:firstName, timestamp=2024-01-20T13:39:59.297, value=Scholar22

```



```

71 column=details:firstName, timestamp=2024-01-20T04:34:52.050, value=Student71
71 column=details:lastName, timestamp=2024-01-20T04:34:52.055, value=LastName71
72 column=details:MidName, timestamp=2024-01-20T13:54:11.378, value=MidName72
72 column=details:firstName, timestamp=2024-01-20T04:34:52.061, value=Student72
72 column=details:lastName, timestamp=2024-01-20T04:34:52.066, value=LastName72
73 column=details:MidName, timestamp=2024-01-20T13:54:11.397, value=MidName73
73 column=details:firstName, timestamp=2024-01-20T04:34:52.072, value=Student73
73 column=details:lastName, timestamp=2024-01-20T04:34:52.078, value=LastName73
74 column=details:MidName, timestamp=2024-01-20T13:54:11.397, value=MidName74
74 column=details:firstName, timestamp=2024-01-20T04:34:52.083, value=Student74
74 column=details:lastName, timestamp=2024-01-20T04:34:52.089, value=LastName74
75 column=details:MidName, timestamp=2024-01-20T13:54:11.406, value=MidName75
75 column=details:firstName, timestamp=2024-01-20T04:34:52.095, value=Student75
75 column=details:lastName, timestamp=2024-01-20T04:34:52.101, value=LastName75
76 column=details:firstName, timestamp=2024-01-20T04:34:52.107, value=Student76
76 column=details:lastName, timestamp=2024-01-20T14:46:28.505, value=LastName76_Modified
77 column=details:firstName, timestamp=2024-01-20T04:34:52.120, value=Student77
77 column=details:lastName, timestamp=2024-01-20T14:46:28.518, value=LastName77_Modified
78 column=details:firstName, timestamp=2024-01-20T04:34:52.136, value=Student78
78 column=details:lastName, timestamp=2024-01-20T14:46:28.524, value=LastName78_Modified
79 column=details:firstName, timestamp=2024-01-20T04:34:52.149, value=Student79
79 column=details:lastName, timestamp=2024-01-20T14:46:28.531, value=LastName79_Modified
8 column=details:firstName, timestamp=2024-01-20T13:39:59.166, value=Scholar8
8 column=details:lastName, timestamp=2024-01-20T04:34:50.946, value=LastName8
80 column=details:firstName, timestamp=2024-01-20T04:34:52.163, value=Student80
80 column=details:lastName, timestamp=2024-01-20T14:46:28.538, value=LastName80_Modified
81 column=details:firstName, timestamp=2024-01-20T04:34:52.177, value=Student81
81 column=details:lastName, timestamp=2024-01-20T14:46:28.544, value=LastName81_Modified
82 column=details:firstName, timestamp=2024-01-20T04:34:52.192, value=Student82
82 column=details:lastName, timestamp=2024-01-20T14:46:28.550, value=LastName82_Modified
83 column=details:firstName, timestamp=2024-01-20T04:34:52.205, value=Student83
83 column=details:lastName, timestamp=2024-01-20T14:46:28.556, value=LastName83_Modified
84 column=details:firstName, timestamp=2024-01-20T04:34:52.217, value=Student84
84 column=details:lastName, timestamp=2024-01-20T14:46:28.563, value=LastName84_Modified
85 column=details:firstName, timestamp=2024-01-20T04:34:52.230, value=Student85
85 column=details:lastName, timestamp=2024-01-20T14:46:28.570, value=LastName85_Modified
86 column=details:firstName, timestamp=2024-01-20T04:34:52.242, value=Student86
86 column=details:lastName, timestamp=2024-01-20T14:46:28.578, value=LastName86_Modified
87 column=details:firstName, timestamp=2024-01-20T04:34:52.256, value=Student87
87 column=details:lastName, timestamp=2024-01-20T14:46:28.585, value=LastName87_Modified
88 column=details:firstName, timestamp=2024-01-20T04:34:52.268, value=Student88
88 column=details:lastName, timestamp=2024-01-20T14:46:28.592, value=LastName88_Modified
89 column=details:firstName, timestamp=2024-01-20T04:34:52.281, value=Student89
89 column=details:lastName, timestamp=2024-01-20T14:46:28.598, value=LastName89_Modified
9 column=details:firstName, timestamp=2024-01-20T13:39:59.174, value=Scholar9
9 column=details:lastName, timestamp=2024-01-20T04:34:50.974, value=LastName9
89 row(s)
Took 0.1159 seconds
hbase(main):191:0>

```

## Exercise 10: HBase Data Manipulation

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

```
[40, 60, 80, 90].each do |i|
```

```
  get 'students', "#{i}"
```

```
end
```

```

hbase(main):191:0> [40, 60, 80, 90].each do |i|
hbase(main):192:1* get 'students', "#{i}"
hbase(main):193:1> end
COLUMN                                CELL
  details:firstName                    timestamp=2024-01-20T13:39:59.439, value=Scholar40
  details:lastName                     timestamp=2024-01-20T04:34:51.622, value=LastName40
1 row(s)
Took 0.0162 seconds
COLUMN                                CELL
  details:MidName                      timestamp=2024-01-20T13:54:11.234, value=MidName60
  details:firstName                    timestamp=2024-01-20T04:34:51.894, value=Student60
  details:lastName                     timestamp=2024-01-20T04:34:51.900, value=LastName60
1 row(s)
Took 0.0060 seconds
COLUMN                                CELL
  details:firstName                    timestamp=2024-01-20T04:34:52.163, value=Student80
  details:lastName                     timestamp=2024-01-20T14:46:28.538, value=LastName80_Modified
1 row(s)
Took 0.0107 seconds
COLUMN                                CELL
0 row(s)
Took 0.0042 seconds
=> [40, 60, 80, 90]
hbase(main):194:0>

```