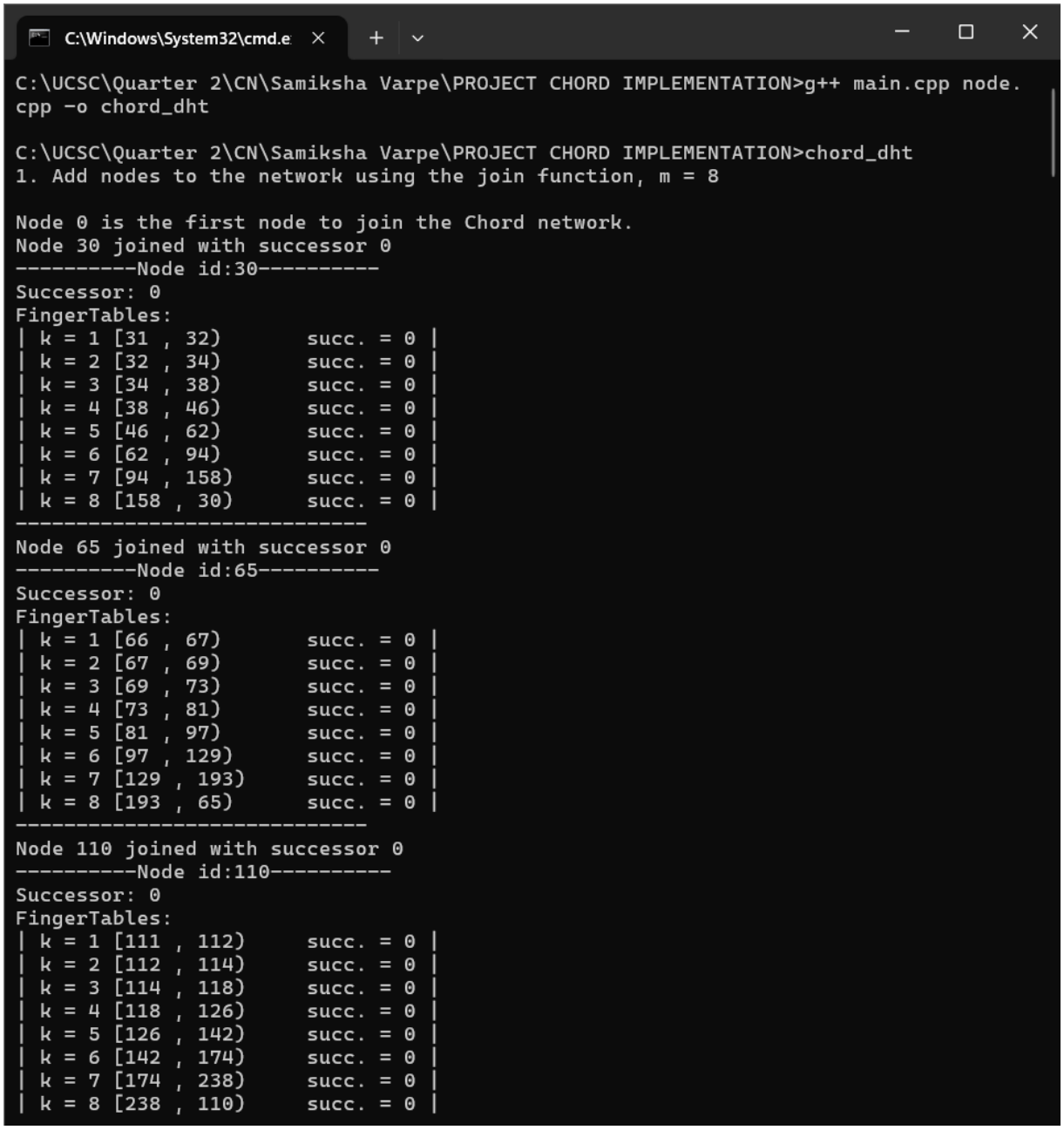
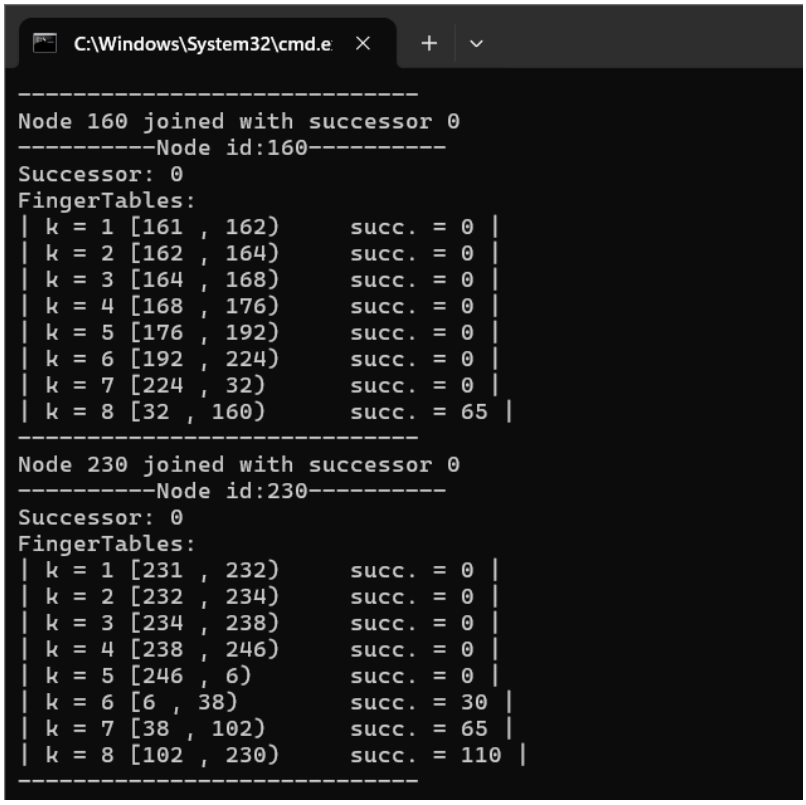
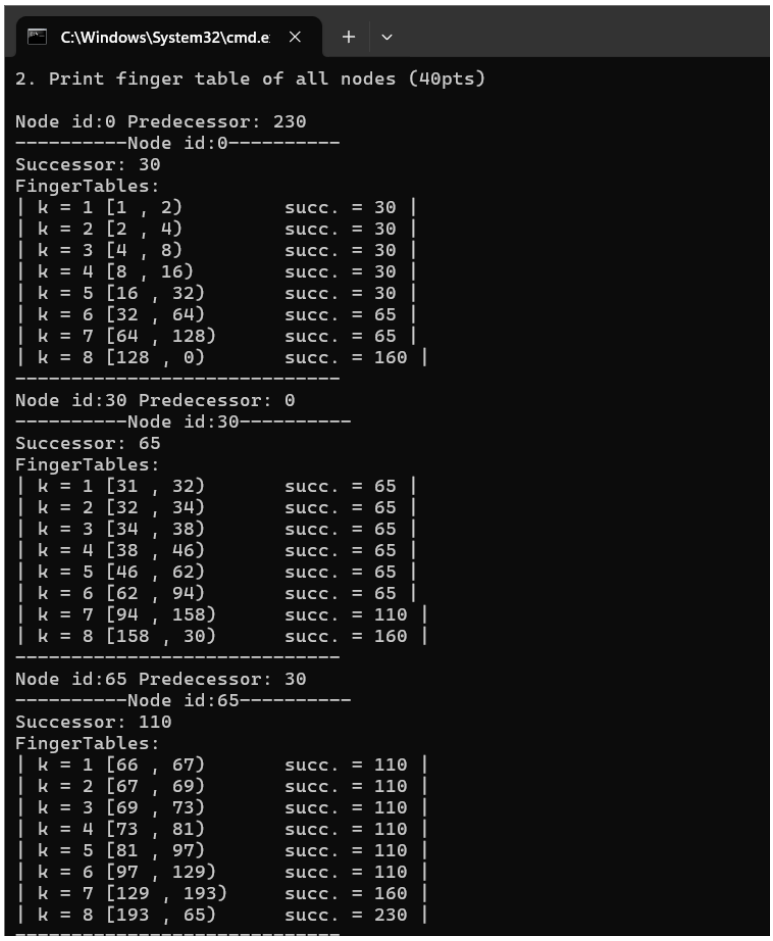
1. Add nodes to the network using the join function, $m = 8$





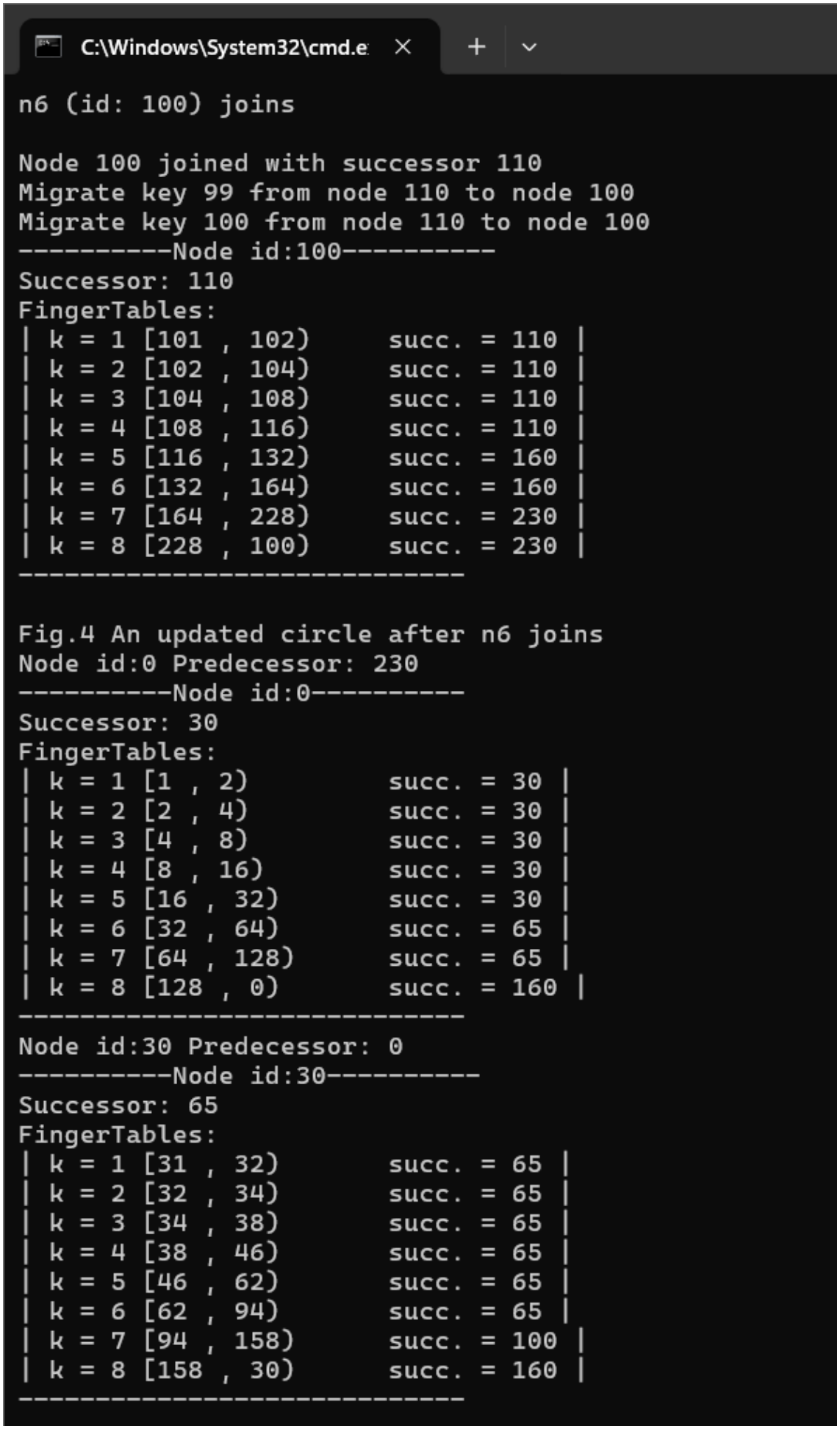
2. Print finger table of all nodes

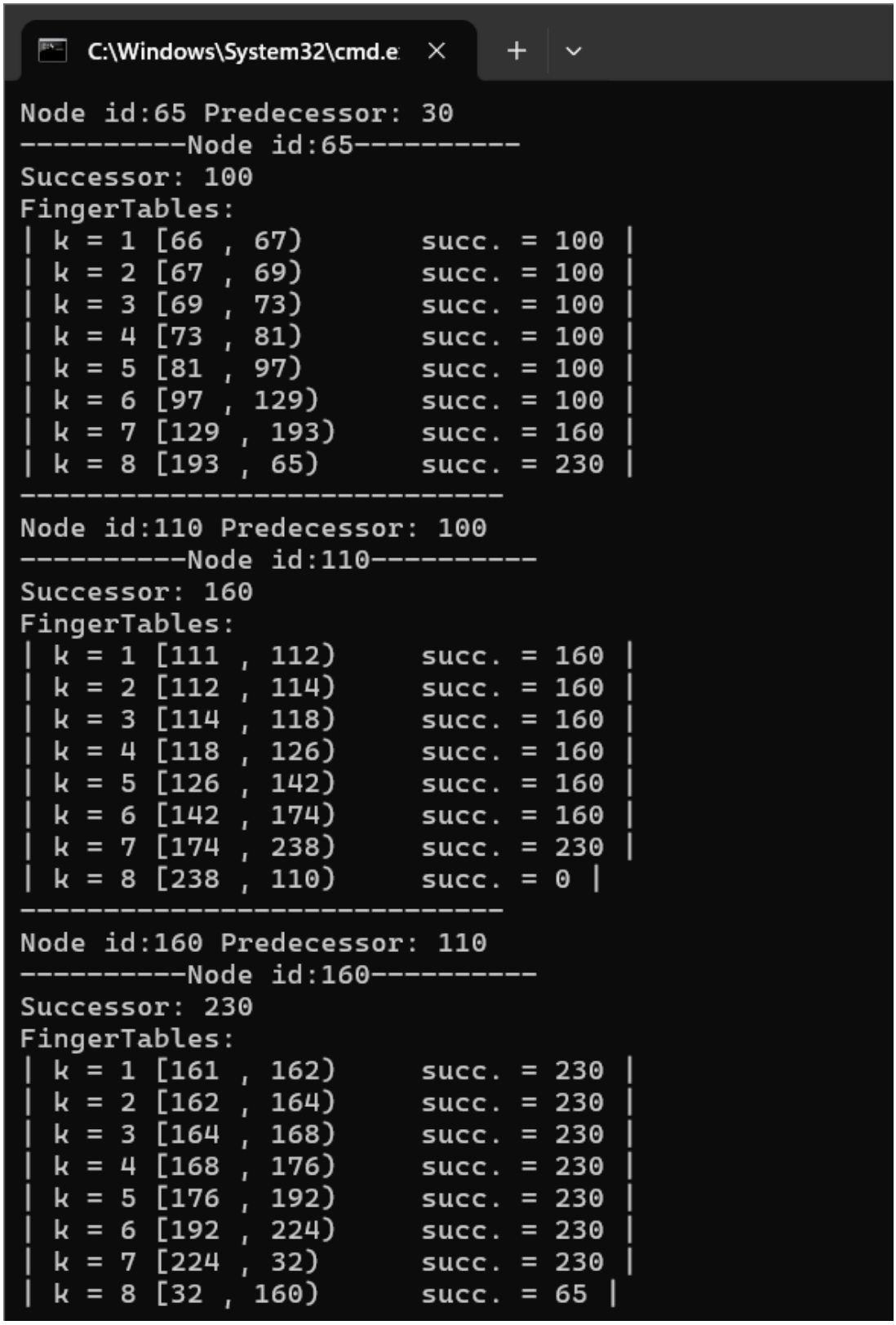


```
----------------------------
Node id:110 Predecessor: 65
----------Node id:110----------
Successor: 160
FingerTables:
| k = 1 [111 , 112)     succ. = 160 |
| k = 2 [112 , 114)     succ. = 160 |
| k = 3 [114 , 118)     succ. = 160 |
| k = 4 [118 , 126)     succ. = 160 |
| k = 5 [126 , 142)     succ. = 160 |
| k = 6 [142 , 174)     succ. = 160 |
| k = 7 [174 , 238)     succ. = 230 |
| k = 8 [238 , 110)     succ. = 0 |
----------------------------
Node id:160 Predecessor: 110
----------Node id:160----------
Successor: 230
FingerTables:
| k = 1 [161 , 162)     succ. = 230 |
| k = 2 [162 , 164)     succ. = 230 |
| k = 3 [164 , 168)     succ. = 230 |
| k = 4 [168 , 176)     succ. = 230 |
| k = 5 [176 , 192)     succ. = 230 |
| k = 6 [192 , 224)     succ. = 230 |
| k = 7 [224 , 32)      succ. = 230 |
| k = 8 [32 , 160)      succ. = 65 |
----------------------------
Node id:230 Predecessor: 160
----------Node id:230----------
Successor: 0
FingerTables:
| k = 1 [231 , 232)     succ. = 0 |
| k = 2 [232 , 234)     succ. = 0 |
| k = 3 [234 , 238)     succ. = 0 |
| k = 4 [238 , 246)     succ. = 0 |
| k = 5 [246 , 6)       succ. = 0 |
| k = 6 [6 , 38)        succ. = 30 |
| k = 7 [38 , 102)      succ. = 65 |
| k = 8 [102 , 230)     succ. = 110 |
----------------------------
```

3. Insert keys and add new node joins

3.1 print keys that stored in each node

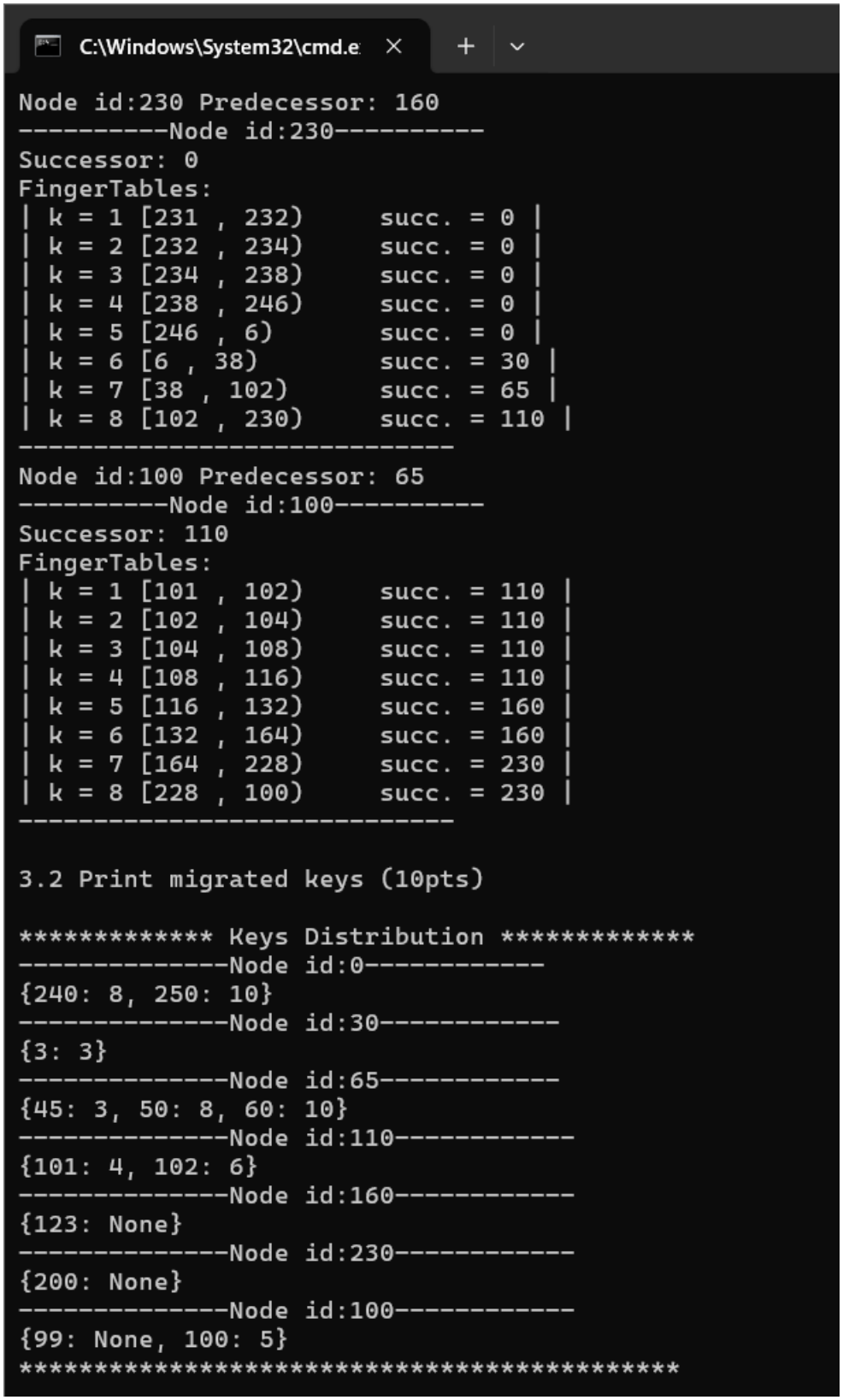

C:\Windows\System32\cmd.e
n6 (id: 100) joins
Node 100 joined with successor 110
Migrate key 99 from node 110 to node 100
Migrate key 100 from node 110 to node 100
----------Node id:100----------
Successor: 110
FingerTables:
| k = 1 [101 , 102) succ. = 110 |
| k = 2 [102 , 104) succ. = 110 |
| k = 3 [104 , 108) succ. = 110 |
| k = 4 [108 , 116) succ. = 110 |
| k = 5 [116 , 132) succ. = 160 |
| k = 6 [132 , 164) succ. = 160 |
| k = 7 [164 , 228) succ. = 230 |
| k = 8 [228 , 100) succ. = 230 |
Fig.4 An updated circle after n6 joins
Node id:0 Predecessor: 230
----------Node id:0----------
Successor: 30
FingerTables:
| k = 1 [1 , 2) succ. = 30 |
| k = 2 [2 , 4) succ. = 30 |
| k = 3 [4 , 8) succ. = 30 |
| k = 4 [8 , 16) succ. = 30 |
| k = 5 [16 , 32) succ. = 30 |
| k = 6 [32 , 64) succ. = 65 |
| k = 7 [64 , 128) succ. = 65 |
| k = 8 [128 , 0) succ. = 160 |
Node id:30 Predecessor: 0
----------Node id:30----------
Successor: 65
FingerTables:
| k = 1 [31 , 32) succ. = 65 |
| k = 2 [32 , 34) succ. = 65 |
| k = 3 [34 , 38) succ. = 65 |
| k = 4 [38 , 46) succ. = 65 |
| k = 5 [46 , 62) succ. = 65 |
| k = 6 [62 , 94) succ. = 65 |
| k = 7 [94 , 158) succ. = 100 |
| k = 8 [158 , 30) succ. = 160 |


C:\Windows\System32\cmd.e
Node id:65 Predecessor: 30
----------Node id:65----------
Successor: 100
FingerTables:
| k = 1 [66 , 67)   succ. = 100 |
| k = 2 [67 , 69)   succ. = 100 |
| k = 3 [69 , 73)   succ. = 100 |
| k = 4 [73 , 81)   succ. = 100 |
| k = 5 [81 , 97)   succ. = 100 |
| k = 6 [97 , 129)   succ. = 100 |
| k = 7 [129 , 193)   succ. = 160 |
| k = 8 [193 , 65)   succ. = 230 |

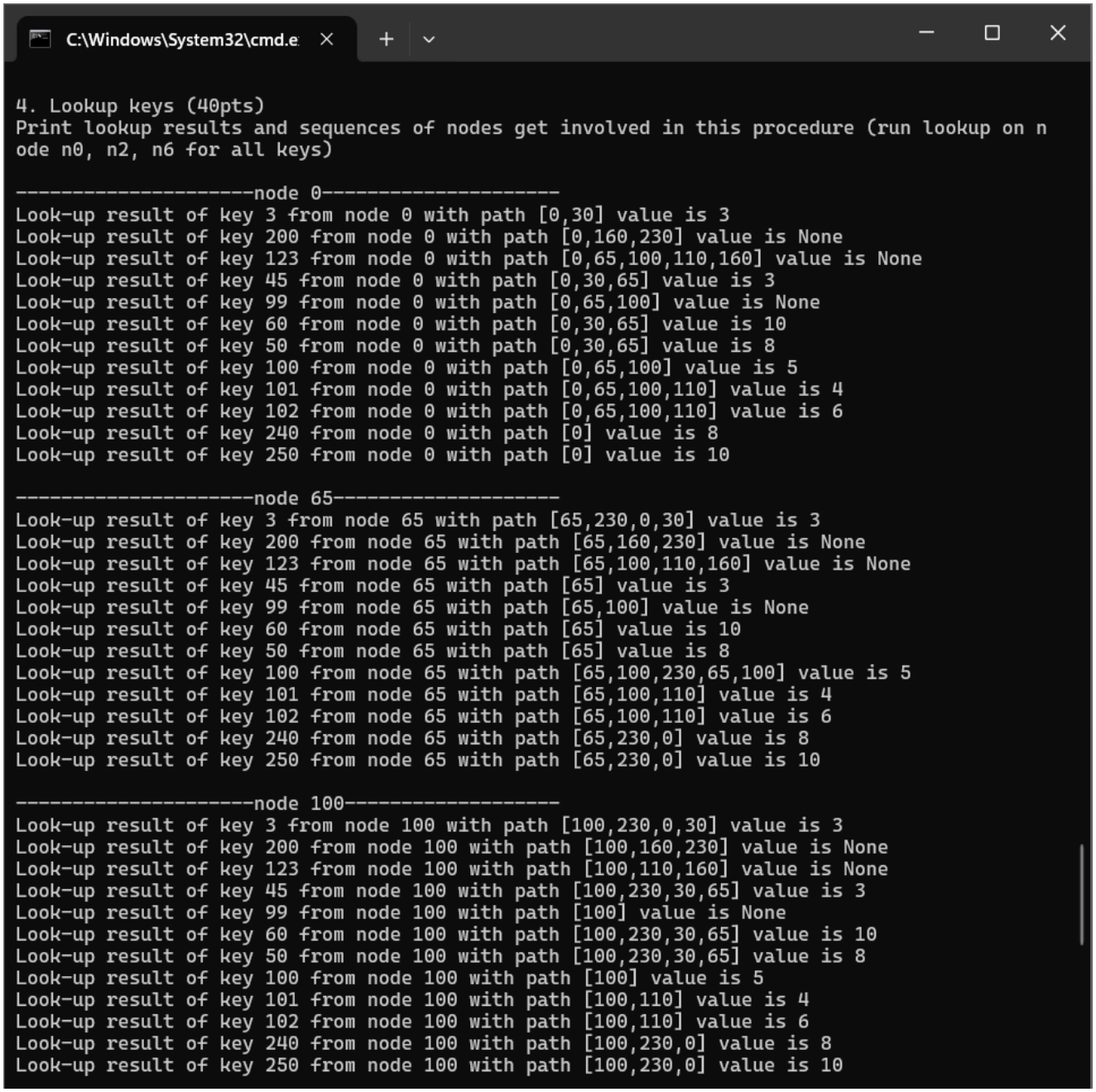
Node id:110 Predecessor: 100
----------Node id:110----------
Successor: 160
FingerTables:
| k = 1 [111 , 112)   succ. = 160 |
| k = 2 [112 , 114)   succ. = 160 |
| k = 3 [114 , 118)   succ. = 160 |
| k = 4 [118 , 126)   succ. = 160 |
| k = 5 [126 , 142)   succ. = 160 |
| k = 6 [142 , 174)   succ. = 160 |
| k = 7 [174 , 238)   succ. = 230 |
| k = 8 [238 , 110)   succ. = 0 |

Node id:160 Predecessor: 110
----------Node id:160----------
Successor: 230
FingerTables:
| k = 1 [161 , 162)   succ. = 230 |
| k = 2 [162 , 164)   succ. = 230 |
| k = 3 [164 , 168)   succ. = 230 |
| k = 4 [168 , 176)   succ. = 230 |
| k = 5 [176 , 192)   succ. = 230 |
| k = 6 [192 , 224)   succ. = 230 |
| k = 7 [224 , 32)   succ. = 230 |
| k = 8 [32 , 160)   succ. = 65 |

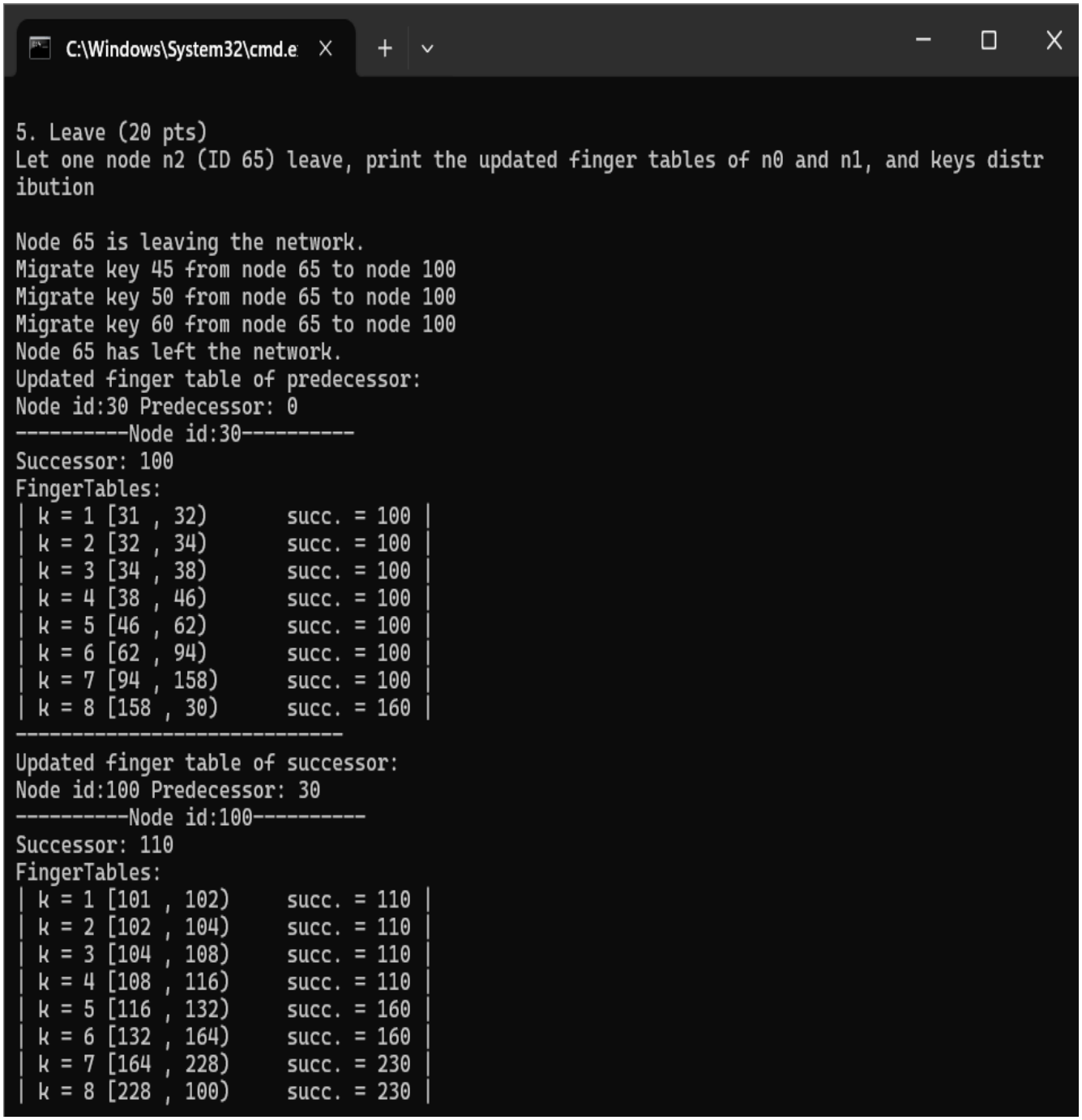
3.2. Print migrated keys (10pts)

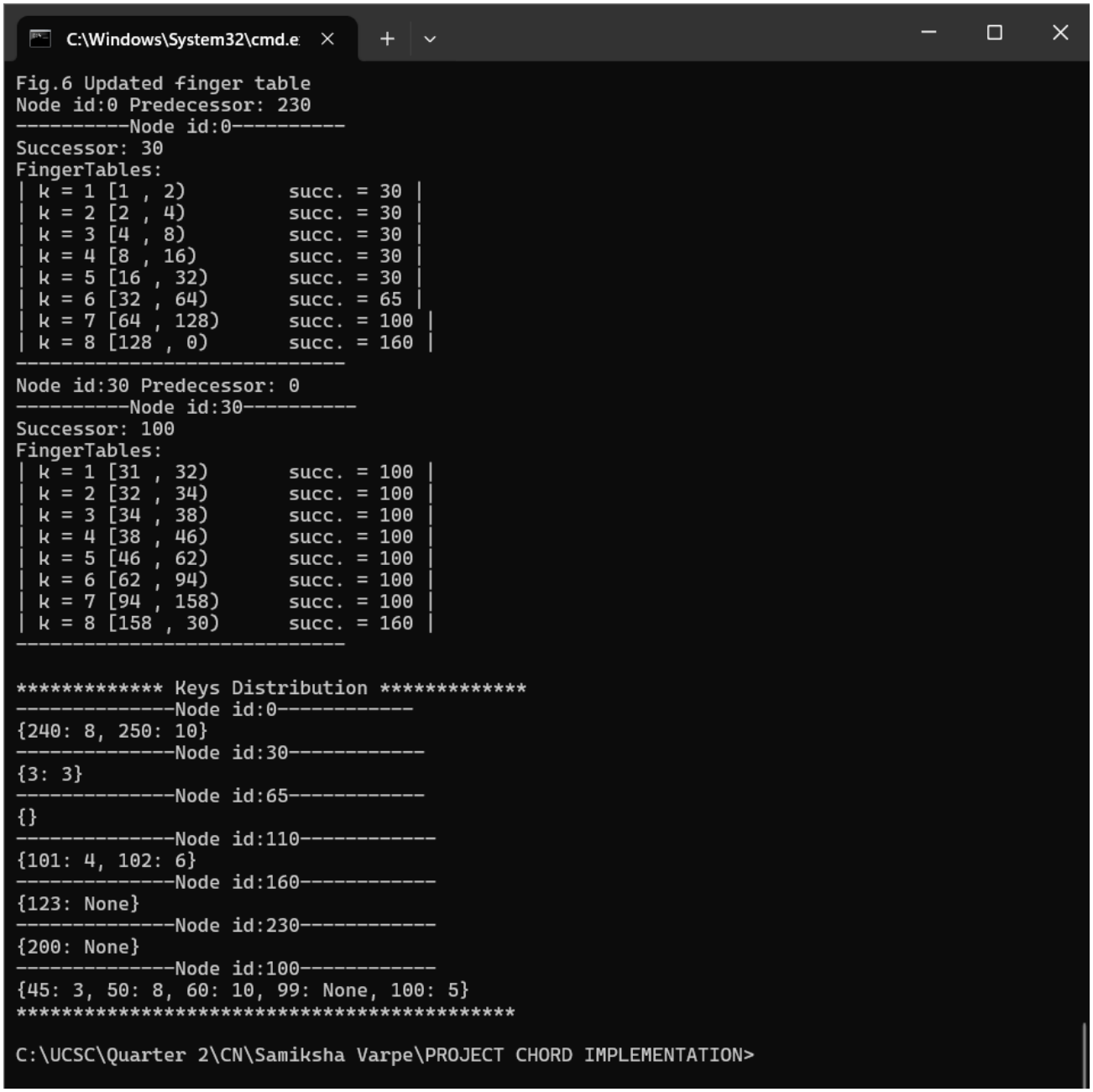


4. Lookup keys (40pts)



5. Leave (20 pts)




C:\Windows\System32\cmd.e
Fig.6 Updated finger table
Node id:0 Predecessor: 230
----------Node id:0----------
Successor: 30
FingerTables:
| k = 1 [1 , 2)   succ. = 30 |
| k = 2 [2 , 4)   succ. = 30 |
| k = 3 [4 , 8)   succ. = 30 |
| k = 4 [8 , 16)   succ. = 30 |
| k = 5 [16 , 32)   succ. = 30 |
| k = 6 [32 , 64)   succ. = 65 |
| k = 7 [64 , 128)   succ. = 100 |
| k = 8 [128 , 0)   succ. = 160 |

Node id:30 Predecessor: 0
----------Node id:30----------
Successor: 100
FingerTables:
| k = 1 [31 , 32)   succ. = 100 |
| k = 2 [32 , 34)   succ. = 100 |
| k = 3 [34 , 38)   succ. = 100 |
| k = 4 [38 , 46)   succ. = 100 |
| k = 5 [46 , 62)   succ. = 100 |
| k = 6 [62 , 94)   succ. = 100 |
| k = 7 [94 , 158)   succ. = 100 |
| k = 8 [158 , 30)   succ. = 160 |

********** Keys Distribution **********
----------Node id:0----------
{240: 8, 250: 10}
----------Node id:30----------
{3: 3}
----------Node id:65----------
{}
----------Node id:110----------
{101: 4, 102: 6}
----------Node id:160----------
{123: None}
----------Node id:230----------
{200: None}
----------Node id:100----------
{45: 3, 50: 8, 60: 10, 99: None, 100: 5}
****
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