**TEMPLATE FOR ASSIGNMENT #4 REPORT**

**Student Name and CCID:**

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**By submitting this assignment the students named above confirm that they have worked on it themselves without any help by other people. If any external resources were used please state which ones and how they were used:**

**PART 1**

**Task A (1) (no index):**

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| --- | --- |
| **Cardinality of Table Parts** | **Average Processing time for index free Q1 (ms)** |
| 100 | 0.03997802734375 ms on average |
| 1000 | 0.039963722229003906 ms on average |
| 10,000 | 0.060062408447265625 ms on average |
| 100,000 | 0.09930133819580078 ms on average |
| 1,000,000 | 0.19540786743164062 ms on average |

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| **Cardinality of Table Parts** | **Average Processing time for index free Q2 (ms)** |
| 100 | 0.08081436157226562 ms on average |
| 1000 | 0.0798797607421875 ms on average |
| 10,000 | 0.279998779296875 ms on average |
| 100,000 | 2.2298574447631836 ms on average |
| 1,000,000 | 15.000104904174805 ms on average |

**Task B (2):**

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| **Compare, contrast and explain the trends observable in both tables above (Task A)** |
| Upwards trend as table cardinality increases which is expected as there are more rows to check against.  Query 1 is the one of the simplest SQL queries possible, checking for rows that have a certain primary key. Query 2 has the potential to return multiple values, so it makes sense that it has a much longer execution time for larger table cardinalities than Query1. |

**Task C (3) (using index):**

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| **Cardinality of Table Parts** | **Average Processing time for indexed Q1 (ms)** |
| 100 | 0.061707496643066406 ms on average |
| 1000 | 0.070343017578125 ms on average |
| 10,000 | 0.12003898620605469 ms on average |
| 100,000 | 0.0995635986328125 ms on average |
| 1,000,000 | 0.20074844360351562 ms on average |

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| **Cardinality of Table Parts** | **Average Processing time for indexed Q2 (ms)** |
| 100 | 0.06004810333251953 ms on average |
| 1000 | 0.07236003875732422 ms on average |
| 10,000 | 0.17885684967041016 ms on average |
| 100,000 | 0.10018348693847656 ms on average |
| 1,000,000 | 0.19998550415039062 ms on average |

**Task D (4):**

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| **Compare, contrast and explain the trends observable in both tables above (Task C)** |
| The values are quite similar in both tables above, with a general upward trend with some minor irregularities that can be explained through cache or OS-availability reasons. |

**Task E (5):**

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| **Compare, contrast and explain the trends observed in Task D to the trends observed in Task B. Discuss the cost-benefit of the index space cost and query performance.** |
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**PART 2**

**Task F (6) (no index):**

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| **Cardinality of Table Parts** | **Average Processing time for index-free Q3 (ms)** |
| 100 | 0.060830116271972656 ms on average |
| 1000 | 0.38018226623535156 ms on average |
| 10,000 | 3.853158950805664 ms on average |
| 100,000 | 52.478981018066406 ms on average |
| 1,000,000 | 468.9213752746582 ms on average |

**Task G (7) (using index):**

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| **Cardinality of Table Parts** | **Average Processing time for indexed Q3 (ms)** |
| 100 | 0.039887428283691406 ms on average |
| 1000 | 0.0599980354309082 ms on average |
| 10,000 | 0.09023904800415039 ms on average |
| 100,000 | 0.29296398162841797 ms on average |
| 1,000,000 | 15.404446125030518 ms on average |

**Task H (8):**

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| **Compare, contrast and explain the trends observed in Task F to the trends observed in Task G. Discuss the cost-benefit of the index space cost and query performance.** |
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**PART 3**

**Task I (9) (no index):**

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| **Cardinality of Table Parts** | **Average Processing time for no-index Q4 (ms)** |
| 100 | 0.03998756408691406 ms on average |
| 1000 | 0.14000892639160156 ms on average |
| 10,000 | 0.6001615524291992 ms on average |
| 100,000 | 7.63401985168457 ms on average |
| 1,000,000 | 82.5016975402832 ms on average |

**Task J (10):**

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| **Define an index that you believe will optimize Q4 and explain why you think so.** |
| "CREATE INDEX idxQ4Optimize ON Parts (partPrice)" |

**Task K (11) (using index):**

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| **Cardinality of Table Parts** | **Average Processing time for indexed Q4 (ms)** |
| 100 | 0.056891441345214844 ms on average |
| 1000 | 0.09922504425048828 ms on average |
| 10,000 | 0.11074066162109375 ms on average |
| 100,000 | 0.10683536529541016 ms on average |
| 1,000,000 | 0.6117820739746094 ms on average |

**Task L (12):**

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| **Compare, contrast and explain the trends observed in Task K to the trends observed in Task I. Discuss the cost-benefit of the index space cost and query performance.** |
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**PART 4**

**Task M (13) (no index):**

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| **Cardinality of Table Parts** | **Average Processing time for index-free Q5 (ms)** |
| 100 | 0.0600433349609375 ms on average |
| 1000 | 0.13998031616210938 ms on average |
| 10,000 | 0.7808732986450195 ms on average |
| 100,000 | NA |
| 1,000,000 | NA |

**Task N (14) (no index):**

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| **Cardinality of Table Parts** | **Average Processing time for index-free Q6 (ms)** |
| 100 | 0.2009725570678711 ms on average |
| 1000 | 1.8228483200073242 ms on average |
| 10,000 | 17.976484298706055 ms on average |
| 100,000 | 171.92165851593018 ms on average |
| 1,000,000 | 1614.9428844451904 ms on average |

**Task O (15):**

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| **Compare, contrast and explain the trends observed in Task M to the trends observed in Task N** |
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**Task P (16):**

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| **Define an index that you believe will optimize Q6 and explain why you think so** |
| "CREATE INDEX idxQ6Optimize ON Parts (needsPart, partnumber);" |

**Task Q (17) (with index):**

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| **Cardinality of Table Parts** | **Average Processing time for indexed Q6 (ms)** |
| 100 | 0.24481296539306638 ms on average |
| 1000 | 0.6799793243408203 ms on average |
| 10,000 | 3.8686227798461914 ms on average |
| 100,000 | 41.22483730316162 ms on average |
| 1,000,000 | 399.3643283843994 ms on average |

**Task R (18):**

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| **Compare, contrast and explain the trends observed in Task N to the trends observed in Task Q. Discuss the cost-benefit of the index space cost and query performance.** |
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