Question 1: Modern OLTP Indexes (Part II) . . . . . [160 points]

(i) **[10 points] Trie Index:**
Distinguish between a B+tree and a Trie.

(ii) **[10 points] Trie Index:**
What is the computational complexity of operations in a Trie?

(iii) **[10 points] Trie Index:**
Define the span of a trie level.

(iv) **[10 points] Trie Index:**
How does the span of a trie level determine the fan-out of each node?

(v) **[10 points] Radix Tree:**
Distinguish between a Trie and a Radix Tree.

(vi) **[10 points] Radix Tree:**
Explain why a Radix Tree can produce false positives.

(vii) **[10 points] Judy Arrays:**
Explain how Judy Arrays support an adaptive node representation.

(viii) **[10 points] Judy Arrays:**
Explain why fat pointers are used in Judy Arrays.

(ix) **[10 points] Judy Arrays:**
Distinguish between a Linear Node and a Bitmap Node.

(x) **[10 points] Adaptive Radix Tree:**
Distinguish between Adaptive Radix Tree and Judy Array.

(xi) **[10 points] Adaptive Radix Tree:**
List the types of nodes in an Adaptive Radix Tree.

(xii) **[10 points] Adaptive Radix Tree:**
Explain why binary comparable keys are required in a Radix Tree.

(xiii) **[10 points] MassTree:**
Distinguish between Adaptive Radix Tree and MassTree.

(xiv) **[10 points] MassTree:**
Explain how MassTree is optimized for long keys.

(xv) **[20 points] In-Memory Indexes:**
Why does Adaptive Radix Tree outperform BwTree?

End of Problem Set