Problem

Give an informal description of a pushdown automaton that recognizes the language A in Exercise 2.9.

Step-by-step solution

Step 1 of 1

2287-2-10E AID: 824

RID: 944

Given language is

$A = \{a^i b^j c^k \mid i = j \text{ or } j = k \text{ where } i, j, k \geq 0\}$

The language is union of two languages $\{a^i b^i c^k \mid i, k \geq 0\}$ and $\{a^i b^k c^k \mid i, k \geq 0\}$.

Let $A_1 = \{a^i b^i c^k \mid i, k \geq 0\}$ and $A_2 = \{a^i b^k c^k \mid i, k \geq 0\}$.

The informal description of the PDA that recognizes the language A_1.

In more detail, it operates as follows:

• Read and push $a's$.

• Read $b's$, while popping $a's$.

• If $b's$ finish when stack is empty, skip $c's$ on input and accept.

The informal description of the PDA that recognizes the language A_2.

In more detail, it operates as follows:

• Skip $a's$ on input.

• Read and push $b's$.

• Read $c's$, while popping $b's$.

• If $c's$ finish when stack is empty, accept.

The informal description of the PDA that recognizes the language A is the combinition of both the languages A_1 and A_2.

In more detail, it operates as follows:

1. Nondeterministically branck to either step 2 or step 6.

2. Read and push $a's$.

3. Read $b's$, while popping $a's$.

4. If $b's$ finish when stack is empty, skip $c's$ on input and accept.

5. Skip $a's$ on input.

6. Read and push $b's$.

7. Read $c's$, while popping $b's$.

8. If $c's$ finish when stack is empty, accept.

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