552. Student Attendance Record II

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- Total Accepted: **1442**
- Total Submissions: **5167**
- Difficulty: **Hard**
- Contributors:fallcreek

Given a positive integer **n**, return the number of all possible attendance records with length n, which will be regarded as rewardable. The answer may be very large, return it after mod 109 + 7.

A student attendance record is a string that only contains the following three characters:

1. **'A'** : Absent.
2. **'L'** : Late.
3. **'P'** : Present.

A record is regarded as rewardable if it doesn't contain **more than one 'A' (absent)** or **more than two continuous 'L' (late)**.

Example 1:

Input: `n = 2` **Output:** `8` **Explanation:**

`There are 8 records with length 2 will be regarded as rewardable:`

`"PP" , "AP", "PA", "LP", "PL", "AL", "LA", "LL"`

Only "AA" won't be regarded as rewardable owing to more than one absent times.

Note: The value of **n** won't exceed 100,000.

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A0[i] is the number of sequences with length i that does not have 'A'.
A1[i] is the number of sequences with length i that has only one 'A'.

```
class Solution {
public:
    int checkRecord(int n) {
        //a0[0]=1, a1[0]=0;
        //a0[1]=2, a1[1]=1;
        //a0[2]=4, a1[2]=4;
        //a0[i]= a0[i-1] // +p
        //      + a0[i-2] //+PL
        //      + a0[i-3] //+PLL,
        //a1[i]= a0[i-1]  -- +A
        //      + a1[i-1] -- +P
        //      + a1[i-2] -- +PL
        //      + a1[i-3] -- +PLL
        //      + a0[i-2] -- +AL
        //      + a0[i-3] -- +ALL
        vector<long> A0(n+1, 1), A1(n+1,0);
        A0[1]=2; A1[1]=1;
        A0[2]=4; A1[2]=4;
        for (int i=3; i<=n; i++) {
            A0[i]=(A0[i-1] + A0[i-2] + A0[i-3]) % (long)1000000007;
            A1[i]= (A0[i-1] + A1[i-1] + A1[i-2] + A1[i-3] + A0[i-2] +
A0[i-3]) % (long)1000000007;
        }
        return (A0.back() + A1.back())% (long)1000000007;
    }
};
```