

Experiment ‘p4_3_b_every_second_letter’ Results

December 18, 2025

Experiment outcome: FAILURE_VERIFY

Bad responses: 0

Responses containing assume : 0

Resolution attempts: 8

Hard fails (resolution): 0

Soft fails (resolution): 0

Verification attempts: 8

Problem Specification

Problem name: p4_3_b_every_second_letter

Natural language statement: Write a method that takes a string and returns every second letter of the string.

Method signature: p4_3_b_every_second_letter(s: string) returns (result: string)

Ensures

- $|result| * 2 == |s| \text{ || } |result| * 2 + 1 == |s|$
- $\forall i :: 0 \leq i < |result| \implies result[i] == s[2 * i]$

GenAI interactions

Below you will find all interactions between the ‘user’ (program) and the ‘assistant’ (OpenAI).

Program → GenAI

You are given the following task to perform in Dafny:

Write a method that takes a string and returns every second letter of the string.

The signature should be:

```
method p4_3_b_every_second_letter(s: string) returns (result: string)
```

The method should respect the following contract:

```
ensures |result| * 2 == |s| || |result| * 2 + 1 == |s|, ensures forall i :: 0 <= i < |  
    ↪ result| ==> result[i] == s[2 * i]
```

Produce and show only the Dafny body of this method, including the curly braces that
 ↪ surround it. Do not show the signature nor contract. You must not use ‘assume’
 ↪ anywhere in your code.

GenAI → Program

System fingerprint:

ID: chatmpl-Co4cRM40TmvQT9ONeViEDkuygGq1j

Model: gpt-5.1-chat-latest

Created at: 1766050191

Finish reason: stop

Usage: 338 tokens in, and 131 tokens out

```
{  
    result := "";  
    var i := 0;  
    while i < |s|  
        invariant 0 <= i <= |s|  
        invariant |result| * 2 == i || |result| * 2 + 1 == i  
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]  
    {  
        result := result + s[i..i+1];  
        i := i + 2;  
    }  
}
```

Program → GenAI

When using dafny verify, the below error is emitted and verify fails:

```
problem_data/p4_3_b_every_second_letter/program.dfy(8,21): Error: this invariant could  
    ↪ not be proved to be maintained by the loop
```

```

Related message: loop invariant violation
|
8 | invariant 0 <= i <= |s|
| ^^

problem_data/p4_3_b_every_second_letter/program.dfy(10,14): Error: this invariant could
    ↪ not be proved to be maintained by the loop
Related message: loop invariant violation
|
10 | invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
| ^^^^^^

Dafny program verifier finished with 1 verified, 2 errors

Correct the error by altering only the method body. Produce and show only the Dafny body,
    ↪ including the curly braces that surround it. Do not show the signature nor
    ↪ contract. You must not use 'assume' anywhere in your code.

```

GenAI → Program

System fingerprint:

ID: chatmpl-Co4cUZ2MzCnHEhExSGxgig6zy0g4E

Model: gpt-5.1-chat-latest

Created at: 1766050194

Finish reason: stop

Usage: 741 tokens in, and 378 tokens out

```
{
    result := "";
    var i := 0;
    while i + 1 <= |s|
        invariant 0 <= i <= |s|
        invariant |result| == i / 2
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
    {
        result := result + s[i..i+1];
        i := i + 2;
    }
}
```

Program → GenAI

When using dafny verify, the below error is emitted and verify fails:

```

problem_data/p4_3_b_every_second_letter/program.dfy(8,21): Error: this invariant could
    ↪ not be proved to be maintained by the loop
Related message: loop invariant violation
|
8 | invariant 0 <= i <= |s|
| ^^

```

```

problem_data/p4_3_b_every_second_letter/program.dfy(10,14): Error: this invariant could
    ↪ not be proved to be maintained by the loop
Related message: loop invariant violation
|
10 | invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
| ^^^^^^

Dafny program verifier finished with 1 verified, 2 errors

Correct the error by altering only the method body. Produce and show only the Dafny body,
    ↪ including the curly braces that surround it. Do not show the signature nor
    ↪ contract. You must not use 'assume' anywhere in your code.

```

GenAI → Program

System fingerprint:
ID: chatmpl-Co4cbn5TmhjDNXPfmdhX2c1MQb8pT
Model: gpt-5.1-chat-latest
Created at: 1766050201
Finish reason: stop
Usage: 1075 tokens in, and 262 tokens out

```
{
    result := "";
    var i := 0;
    while i < |s|
        invariant 0 <= i <= |s| + 1
        invariant |result| * 2 == i || |result| * 2 + 1 == i
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
    {
        result := result + s[i..i+1];
        i := i + 2;
    }
}
```

Program → GenAI

When using dafny verify, the below error is emitted and verify fails:

```

problem_data/p4_3_b_every_second_letter/program.dfy(4,0): Error: a postcondition could
    ↪ not be proved on this return path
|
4 | {
| ^
|
problem_data/p4_3_b_every_second_letter/program.dfy(2,29): Related location: this is the
    ↪ postcondition that could not be proved
|
2 | ensures |result| * 2 == |s| || |result| * 2 + 1 == |s|

```

```

| ^^

problem_data/p4_3_b_every_second_letter/program.dfy(10,14): Error: this invariant could
    ↪ not be proved to be maintained by the loop
Related message: loop invariant violation
|
10 | invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
| ^~~~~~

```

Dafny program verifier finished with 1 verified, 2 errors

Correct the error by altering only the method body. Produce and show only the Dafny body,
 ↪ including the curly braces that surround it. Do not show the signature nor
 ↪ contract. You must not use 'assume' anywhere in your code.

GenAI → Program

System fingerprint:

ID: chatcmpl-Co4cfSY1v89NSCRi1uWvceFtFp6wU
Model: gpt-5.1-chat-latest
Created at: 1766050205
Finish reason: stop
Usage: 1523 tokens in, and 247 tokens out

```
{
  result := "";
  var i := 0;
  while i < |s|
    invariant 0 <= i <= |s|
    invariant |result| * 2 == i
    invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
  {
    result := result + s[i..i+1];
    i := i + 2;
  }
}
```

Program → GenAI

When using dafny verify, the below error is emitted and verify fails:

```

problem_data/p4_3_b_every_second_letter/program.dfy(8,21): Error: this invariant could
    ↪ not be proved to be maintained by the loop
Related message: loop invariant violation
|
8 | invariant 0 <= i <= |s|
| ^~~

```

Dafny program verifier finished with 1 verified, 1 error

Correct the error by altering only the method body. Produce and show only the Dafny body,
 ↪ including the curly braces that surround it. Do not show the signature nor
 ↪ contract. You must not use 'assume' anywhere in your code.

GenAI → Program

System fingerprint:

ID: chatcmpl-Co4cjYbX2JiNSkfSdBbswWqVmeFFd

Model: gpt-5.1-chat-latest

Created at: 1766050209

Finish reason: stop

Usage: 1655 tokens in, and 262 tokens out

```
{
    result := "";
    var i := 0;
    while i < |s|
        invariant 0 <= i <= |s| + 1
        invariant |result| * 2 == i || |result| * 2 + 1 == i
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
    {
        result := result + s[i..i+1];
        i := i + 2;
    }
}
```

Program → GenAI

When using dafny verify, the below error is emitted and verify fails:

```
problem_data/p4_3_b_every_second_letter/program.dfy(4,0): Error: a postcondition could
    ↪ not be proved on this return path
|
4 | {
| ^
|
problem_data/p4_3_b_every_second_letter/program.dfy(2,29): Related location: this is the
    ↪ postcondition that could not be proved
|
2 | ensures |result| * 2 == |s| || |result| * 2 + 1 == |s|
| ^^
|
problem_data/p4_3_b_every_second_letter/program.dfy(10,14): Error: this invariant could
    ↪ not be proved to be maintained by the loop
Related message: loop invariant violation
|
10 | invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
| ^~~~~~
```

```
Dafny program verifier finished with 1 verified, 2 errors
```

Correct the error by altering only the method body. Produce and show only the Dafny body,
↳ including the curly braces that surround it. Do not show the signature nor
↳ contract. You must not use 'assume' anywhere in your code.

GenAI → Program

System fingerprint:

ID: chatmpl-Co4cpohWXRhaaQSIIFIwOhhRCqgAy

Model: gpt-5.1-chat-latest

Created at: 1766050215

Finish reason: stop

Usage: 2177 tokens in, and 634 tokens out

```
{
    result := "";
    var i := 0;
    while i < |s|
        invariant 0 <= i <= |s| + 1
        invariant |result| * 2 == i
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
    {
        result := result + s[i..i+1];
        i := i + 2;
    }
}
```

Program → GenAI

When using dafny verify, the below error is emitted and verify fails:

```
problem_data/p4_3_b_every_second_letter/program.dfy(4,0): Error: a postcondition could
    ↳ not be proved on this return path
```

```
|  
4 | {  
| ^
```

```
problem_data/p4_3_b_every_second_letter/program.dfy(2,29): Related location: this is the
    ↳ postcondition that could not be proved
```

```
|  
2 | ensures |result| * 2 == |s| || |result| * 2 + 1 == |s|
| ^^
```

```
Dafny program verifier finished with 1 verified, 1 error
```

Correct the error by altering only the method body. Produce and show only the Dafny body,
↳ including the curly braces that surround it. Do not show the signature nor
↳ contract. You must not use 'assume' anywhere in your code.

GenAI → Program

System fingerprint:

ID: chatcmpl-Co4cxycxyCUBUGBuLCW3hVDSBReQ5E3K

Model: gpt-5.1-chat-latest

Created at: 1766050223

Finish reason: stop

Usage: 2414 tokens in, and 151 tokens out

```
{  
    result := "";  
    var i := 0;  
    while i + 1 <= |s|  
        invariant 0 <= i <= |s|  
        invariant |result| * 2 == i  
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]  
    {  
        result := result + s[i..i+1];  
        i := i + 2;  
    }  
    if i == |s| - 1 {  
        result := result + s[i..i+1];  
    }  
}
```

Program → GenAI

When using dafny verify, the below error is emitted and verify fails:

problem_data/p4_3_b_every_second_letter/program.dfy(8,21): Error: this invariant could
 not be proved to be maintained by the loop

Related message: loop invariant violation

```
|  
8 | invariant 0 <= i <= |s|  
| ^~
```

Dafny program verifier finished with 1 verified, 1 error

Correct the error by altering only the method body. Produce and show only the Dafny body,
 including the curly braces that surround it. Do not show the signature nor
 contract. You must not use 'assume' anywhere in your code.

GenAI → Program

System fingerprint:

ID: chatcmpl-Co4d2vbnykA6cSzoxWyoi0bnpfTQ

Model: gpt-5.1-chat-latest

Created at: 1766050228

Finish reason: stop

Usage: 2652 tokens in, and 262 tokens out

```
{
    result := "";
    var i := 0;
    while i < |s|
        invariant 0 <= i <= |s| + 1
        invariant |result| * 2 == i || |result| * 2 + 1 == i
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
    {
        result := result + s[i..i+1];
        i := i + 2;
    }
}
```

Final Program

```
method p4_3_b_every_second_letter(s: string) returns (result: string)
    ensures |result| * 2 == |s| || |result| * 2 + 1 == |s|
    ensures forall i :: 0 <= i < |result| ==> result[i] == s[2 * i]
{
    result := "";
    var i := 0;
    while i < |s|
        invariant 0 <= i <= |s| + 1
        invariant |result| * 2 == i || |result| * 2 + 1 == i
        invariant forall k :: 0 <= k < |result| ==> result[k] == s[2 * k]
    {
        result := result + s[i..i+1];
        i := i + 2;
    }
}
```

Total Token Usage

Input tokens: 12575
 Output tokens: 2327
 Reasoning tokens: 1280
 Sum of ‘total tokens’: 14902

Experiment Timings

Iteration #8 started at 1766050230150, ended at 1766050234706, lasting 4556ms (4.56 seconds)
 Overall Experiment started at 1766050193147, ended at 1766050234706, lasting 41559ms (41.56 seconds)
 Iteration #4 started at 1766050207267, ended at 1766050211782, lasting 4515ms (4.52 seconds)
 Iteration #5 started at 1766050211782, ended at 1766050217327, lasting 5545ms (5.55 seconds)
 Iteration #6 started at 1766050217327, ended at 1766050225640, lasting 8313ms (8.31 seconds)
 Iteration #7 started at 1766050225640, ended at 1766050230150, lasting 4510ms (4.51 seconds)
 Iteration #1 started at 1766050193147, ended at 1766050196740, lasting 3593ms (3.59 seconds)

Iteration #2 started at 1766050196740, ended at 1766050202955, lasting 6215ms (6.22 seconds)
Iteration #3 started at 1766050202955, ended at 1766050207267, lasting 4312ms (4.31 seconds)