

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

- $|result| * 2 == |s| \vee |result| * 2 + 1 == |s|$
- 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: chatcmpl-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: chatcmpl-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: chatcmpl-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: chatcmpl-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-Co4cxyCUBUGBuLCW3hVDSBReQ5E3K

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-Co4d2vbnykA6cSzoxWyoio0bnpfrTQ

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)