

# Experiment ‘p4\_9\_reverse\_string’ Results

December 18, 2025

**Experiment outcome:** SUCCESS

**Bad responses:** 0

**Responses containing assume :** 0

**Resolution attempts:** 2

**Hard fails (resolution):** 0

**Soft fails (resolution):** 1

**Verification attempts:** 1

## Problem Specification

**Problem name:** p4\_9\_reverse\_string

**Natural language statement:** Write a method that reads a word and returns the word in reverse.

**Method signature:** p4\_9\_reverse\_string(s: string) returns (reversed: string)

### Ensures

- $|\text{reversed}| == |\text{s}|$
- $\text{forall } i :: 0 \leq i < |\text{s}| \implies \text{reversed}[i] == \text{s}[|\text{s}| - 1 - i]$

## 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 reads a word and returns the word in reverse.

The signature should be:

```
method p4_9_reverse_string(s: string) returns (reversed: string)
```

The method should respect the following contract:

```
ensures |reversed| == |s|, ensures forall i :: 0 <= i < |s| ==> reversed[i] == s[|s| - 1  
    ↪ - 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-Co4fXpc2h5SpE678MOKGiUfnlf34L

**Model:** gpt-5.1-chat-latest

**Created at:** 1766050383

**Finish reason:** stop

**Usage:** 310 tokens in, and 263 tokens out

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

### Program → GenAI

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

```

problem_data/p4_9_reverse_string/program.dfy(8,27): Warning: deprecated style: a semi-
  ↪ colon is not needed here
|
8 | invariant 0 <= i <= |s|;
| ^
|
problem_data/p4_9_reverse_string/program.dfy(9,28): Warning: deprecated style: a semi-
  ↪ colon is not needed here
|
9 | invariant |r| == |s| - i;
| ^
|
problem_data/p4_9_reverse_string/program.dfy(10,65): Warning: deprecated style: a semi-
  ↪ colon is not needed here
|
10 | invariant forall k :: 0 <= k < |r| ==> r[k] == s[|s| - 1 - k];
| ^
|
Compilation failed because warnings were found and --allow-warnings is false

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-Co4fbVpLqkBVIiWW7X3KqKlHCu3r5

**Model:** gpt-5.1-chat-latest

**Created at:** 1766050387

**Finish reason:** stop

**Usage:** 799 tokens in, and 132 tokens out

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

## Final Program

```
method p4_9_reverse_string(s: string) returns (reversed: string)
```

```

ensures |reversed| == |s|
ensures forall i :: 0 <= i < |s| ==> reversed[i] == s[|s| - 1 - i]
{
var r := "";
var i := |s|;
while i > 0
    invariant 0 <= i <= |s|
    invariant |r| == |s| - i
    invariant forall k :: 0 <= k < |r| ==> r[k] == s[|s| - 1 - k]
{
    i := i - 1;
    r := r + s[i .. i+1];
}
reversed := r;
}

```

## Total Token Usage

**Input tokens:** 1109

**Output tokens:** 395

**Reasoning tokens:** 128

**Sum of ‘total tokens’:** 1504

## Experiment Timings

**Overall Experiment** started at 1766050385665, ended at 1766050392909, lasting 7244ms (7.24 seconds)

**Iteration #1** started at 1766050385666, ended at 1766050389672, lasting 4006ms (4.01 seconds)

**Iteration #2** started at 1766050389672, ended at 1766050392909, lasting 3237ms (3.24 seconds)