The Leap Year Algorithm

Adrian Borup (adbo@itu.dk)

September 6, 2021

1 A brief description of The Leap Year Algorithm

The Leap Year Algorithm is a simple algorithm to derive whether a year is a leap year. The algorithm can be applied to all numbers y (representing a year) such that $y \in \{n \in \mathbb{Z} \mid 1582 \leq n\}$.

Let P denote the predicate $4 \mid y$, let Q denote the predicate $100 \mid y$, and let S denote the predicate $400 \mid y$. The algorithm states that y is a leap year iff $(P \wedge \neg Q) \vee S$.

The accompanying software implementation of this algorithm follows the general flow diagram shown in Figure 1 on page 2. That is, once the input "*year*" is received, the program shall check if *year* abides by the constraints on y. If not, the program terminates early with an error—such as when *year* is not an integer or the integer is outside the accepted range. If *year* satisfies the constraints and $(P \wedge \neg Q) \vee S$ is also true, the boolean `true` is returned. Otherwise, the boolean `false` is returned.

Error: *year* must be an integer

Error: *year* must at least be 1582

No

No

Start

Receive *year* as an input

Is *year* an integer?

Yes

Is *year* greater than 1581?

Yes

Does 100 divide *year*?

year is not a leap year

Yes

Does 400 divide *year*?

No

No

Yes

No

Does 4 divide *year*?
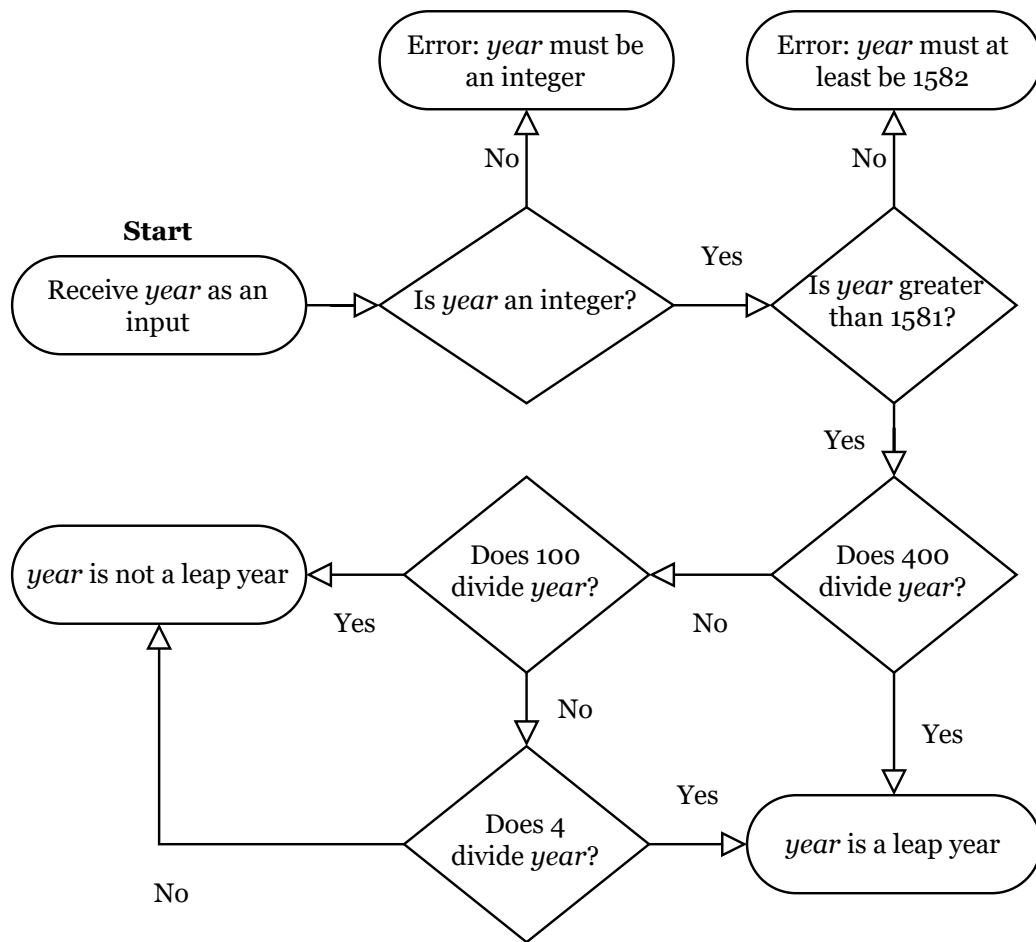
Yes

year is a leap year

No

Figure 1: A flow diagram illustrating the leap year algorithm.

Yes, I made the textual description overly complicated as a joke. Please do forgive me, for I had no idea what text to put upon this paper.