

# Fast Bit Duplication

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**Time limit:** 1.2s   **Memory limit:** 64M

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Given 32-bit unsigned integers, duplicate each bit in-place in the integer.

For example:

- $10001_2$  becomes  $1100000011_2$
- $11110_2$  becomes  $1111111100_2$

## Implementation

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One function:

```
unsigned long long duplicatebits(unsigned long long);
```

**Note:** The function parameter is an `unsigned long long` instead of an `unsigned int` to remove the step of upcasting.

Your function may be called up to  $10^8$  times.