

Declarative Macros | Repetitions

■ Repetitions

- ◆ Portions of macro transcribers can be repeated in order to duplicate many lines of code
- ◆ These are called **repetitions**
- ◆ Repetitions are declared in the **matcher** and can be utilized within the **transcriber**

■ Kinds of Repetitions

- ◆ ? – repeat 0 or 1 times
- ◆ + – repeat at least 1 time
- ◆ * – repeat 0 or more times

■ Matching a Repetition



■ Transcribing a Repetition

```
macro_rules! demo {  
  (  
    $( $metavar:frag ),*  
  ) => {  
    $( $metavar )*  
  }  
}
```

Begin repetition

End repetition

?: Zero or one

```
macro_rules! demo {  
    (  
        $( $a:literal )?  
    ) => {  
        $( $a )?  
    }  
}  
  
demo! ();  
demo! (1);
```

+: One or more

```
macro_rules! demo {  
    (  
        $( $a:literal ), +  
    ) => {  
        $(  
            println!("{}", $a);  
        ) +  
    }  
}  
  
demo!(1);  
demo!(1, 2, 3, 4);
```

■ *: Zero or more

```
macro_rules! demo {  
    (  
        $( $a:literal ),*  
    ) => {  
        $(  
            println!("{}", $a);  
        )*  
    }  
}  
  
demo!();  
demo!(1);  
demo!(1, 2, 3, 4);
```


Multiple Repetitions

```
macro_rules! demo {  
    (  
        $( $a:literal ),*  
        $(,)?  
    ) => {  
        $(  
            println!("{}", $a);  
        )*  
    }  
}  
  
demo!();  
demo!(1);  
demo!(1, 2, 3, 4,);
```

■ Mix & Match

```
macro_rules! test_many {  
    (  
        $fn:ident:  
        $( $in:literal -> $expect:literal ),*  
    ) => {  
        $(  
            assert_eq!($fn($in), $expect);  
        )*  
    }  
}  
  
fn double(v: usize) -> usize {  
    v * 2  
}  
  
test_many!(double: 0->0, 1->2, 2->4, 3->6, 4->8);
```

■ Recap

- ◆ Repetitions are used to “loop” or “iterate” through data supplied to macros
- ◆ Repetitions are created with the dollar (\$) symbol and end with:
 - ? : zero or one
 - + : one or more
 - * : zero or more
- ◆ Repeated data can be separated by supplying a separation character prior to the repetition symbol