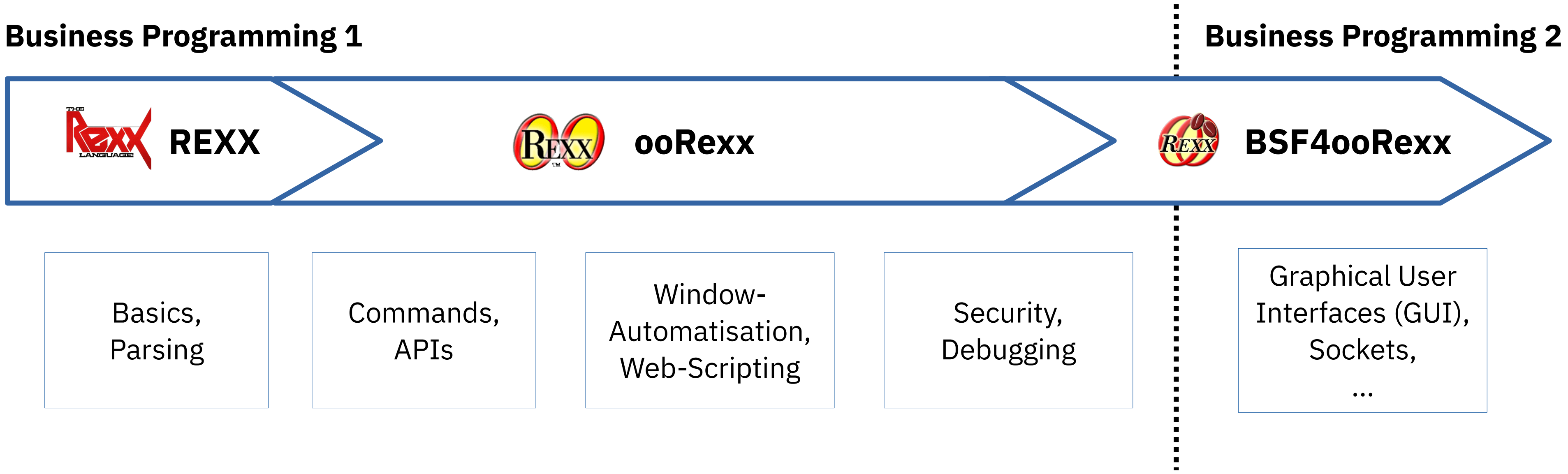
Procedural and Object-oriented Programming 6

Trace (Debug)



TRACE – How Does Your Code Execute?

- Understanding what your Rexx program does
  - Sometimes coding errors cannot be understood easily
  - Keyword statement **TRACE** and built-in function (BIF) **TRACE()**
    - Allows to temporarily have Rexx show in detail how it executes your statements
    - Allows to enter interactive mode that allows to inspect a specific location in your code
  - Most important options
    - **N** normal trace setting, only traces failures in commands
    - **A** show all statements that get executed
    - **R** show all statements and their final results
    - **I** show in detail all intermediate steps when executing a statement
  - Prefixing an option with a question mark (?) causes **TRACE** to become interactive and to trace statements step by step at each press of the *<enter>* key
    - Enter "trace n" to return to normal execution and stop interactive trace

TRACE N – Example, 1

- Simple program, run twice with different output, default option **N**
  - Values change per run because of using the Rexx random()-BIF

```
/* default: "trace normal" in effect */
a=100+20
b=100+random(10,99)
say "a*b:" a*b
```

Output of run # 1:

```
a*b: 16800
```

Output of run # 2:

```
a*b: 17400
```

TRACE A – Example, 2

- Running the program with **TRACE A**
  - Option **A** traces all statements (clauses) before execution

```
trace a      /* show all statements */
a=100+20
b=100+random(10,99)
say "a*b:" a*b
```

Output:

```
      2 *-* a=100+20
      3 *-* b=100+random(10,99)
      4 *-* say "a*b:" a*b
 a*b: 17040
```

TRACE R – Example, 3

- Running the program with **TRACE R**
  - Option **R** traces all statements (clauses) and their final results

```
trace r      /* show results */
a=100+20
b=100+random(10,99)
say "a*b:" a*b
```

Output:

```
      2 *-* a=100+20
        >>>   "120"
      3 *-* b=100+random(10,99)
        >>>   "113"
      4 *-* say "a*b:" a*b
        >>>   "a*b: 13560"
 a*b: 13560
```

TRACE I – Example, 4

- Running the program with **TRACE I**
  - Option **I** traces all intermediate results

```
trace i       /* show intermediates */
a=100+20
b=100+random(10,99)
say "a*b:" a*b
```

Output:

```
     2 *-* a=100+20
       >L>   "100"
       >L>   "20"
       >O>   "+" => "120"
       >>>   "120"
       >=>   A <= "120"
     3 *-* b=100+random(10,99)
       >L>   "100"
       >L>   "10"
       >A>   "10"
       >L>   "99"
       >A>   "99"
       >F>   RANDOM => "98"
       >O>   "+" => "198"
       >>>   "198"
       >=>   B <= "198"
     4 *-* say "a*b:" a*b
       >L>   "a*b:"
       >V>   A => "120"
       >V>   B => "198"
       >O>   "*" => "23760"
       >O>   " " => "a*b: 23760"
       >>>   "a*b: 23760"
a*b: 23760
```

TRACE I, TRACE N – Example, 5

- Running the program with **TRACE I** for tracing a single statement
  - **TRACE N** gets used to reset tracing to the default

```
a=100+20
trace i      /* show intermediates */
b=100+random(10,99)
trace n      /* reset to normal    */
say "a*b:" a*b
```

Output:

```
      3 *-* b=100+random(10,99)
        >L>   "100"
        >L>   "10"
        >A>   "10"
        >L>   "99"
        >A>   "99"
        >F>   RANDOM => "80"
        >O>   "+" => "180"
        >>>   "180"
        >=>   B <= "180"
      4 *-* trace n      /* reset to normal    */
 a*b: 21600
```

TRACE ?A – Example, 6

- Using **TRACE ?A** for tracing all statements in interactive mode
  - Interactive tracing allows for inspecting, changing values, tracing step by step

```
trace ?a      /* show all statements, enter interactive mode */
a=100+20
b=100+random(10,99)
say "a*b:" a*b
```

Output:

```
        +++ "WindowsNT COMMAND E:\tmp\06_ooRexx\19_trace_r_interactive.rex"
      2 *-* a=100+20
+++ Interactive trace. "Trace Off" to end debug, ENTER to continue. +++
say a
120
a=100; trace r
     3 *-*     b=100+random(10,99)
        >>>       "198"
trace off
a*b: 19800
```

Execution stops, manually adding a statement to display the current value of variable **a**, pressing <ENTER> continues.

Execution stops, manually adding two statements: changing variable **a** to 100 and changing tracing to trace results from now on, pressing <ENTER> continues.

Execution stops, manually adding a single statement: set interactive tracing off, pressing <ENTER> continues.