R Error Handling

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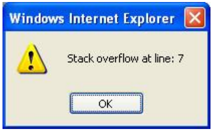
Motivation

Annoyed by errors such as



Stack overflow at line: 7

Principles

1. Fail early
   Notice the error as soon as possible.
2. Fail gracefully
   Allow handling of the error.

Crude way: stop on error

```r
fDivide <- function(a, b) {
    if (!is.numeric(b))
        stop("argument b must be numeric")
    if (b == 0)
        stop("argument b must be non-zero")
    a/b
}
c <- fDivide(5, 0)
```

```
## Error: argument b must be non-zero
```

- Advantages: Fail early
    - notice the error as soon as possible
    - otherwise the return value INF might cause error far below
- Disadvantages: stopped ungraceful
    - We want to handle the error instead of throwing directly
    - We may want to clear up: close connections, delete temporary files, free memory . . .

Confusing way: mixing error and return values

```r
fDivide <- function(a, b) {
    errMsg <- if (!is.numeric(b)) {
        "argument b must be numeric"
    } else if (b == 0) {
        "argument b must be non-zero"
    } else character(0)
    list(result = a/b, errMsg = errMsg)
}
res <- fDivide(5, 0)
if (length(res$errMsg)) {
    # clean up traceback() # prints the call stack
    stop(paste("An unexpected error occured. Please contact the administrator.",
        " Details:", res$errMsg))
} else c <- res$result
```

```
## Error: An unexpected error occured. Please contact the administrator.
## Details: argument b must be non-zero
```

- Advantages: stopped gracefully
- Disadvantages: Code gets really confusing. How to separate return form error signaling?

try statement

Automatic conversion of an error (that is generated by stop) into a return value.

```r
fDivide <- function(a, b) {
    if (b == 0)
        stop("argument b must be non-zero")
    a/b
}

c <- try(fDivide(5, 0), silent = TRUE)
if (inherits(c, "try-error")) {
    stop(paste("An unexpected error occured. Please contact the administrator.",
        " Details:", res$errMsg))
}
```

```
## Error: An unexpected error occured. Please contact the administrator.
## Details: argument b must be non-zero
```

First stop in fDivide ensures "Fail early"

Try combined with second stop ensures "Fail gracefully"

tryCatch statement

```r
tryCatch({
    c <- fDivide(5, 0)
    cat("This code is not executed because the error by division is trapped\n")
}, error = function(e) {
    stop(paste("An unexpected error occured. Please contact the administrator.",
        " Details:", e$message))
}, finally = {
    cat("do some cleanup (e.g. setwd)\n")
})
```

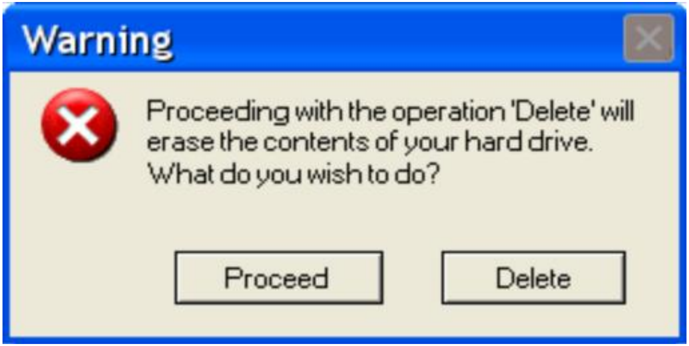
```
## Error: An unexpected error occured. Please contact the administrator.
## Details: argument b must be non-zero


## do some cleanup (e.g. setwd)
```

- Code is now quite clear
- error: returning value after error
  - Called from the level of the code-block of tryCatch
  - Hence, variables defined in this code block before the error are known
- finally: expression that is executed both on success and on error

Summary

- Principles
  1. Fail early
  2. Fail gracefully
- R support
  - ?try
  - ?tryCatch
- other Languages
  - `http://en.wikipedia.org/wiki/Exception_handling_syntax`

Thank you


Warning

Proceeding with the operation 'Delete' will erase the contents of your hard drive. What do you wish to do?