Bahasa Pemrograman Singkong

Antara Passion dan Kolaborasi Riset

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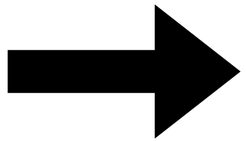
Agenda

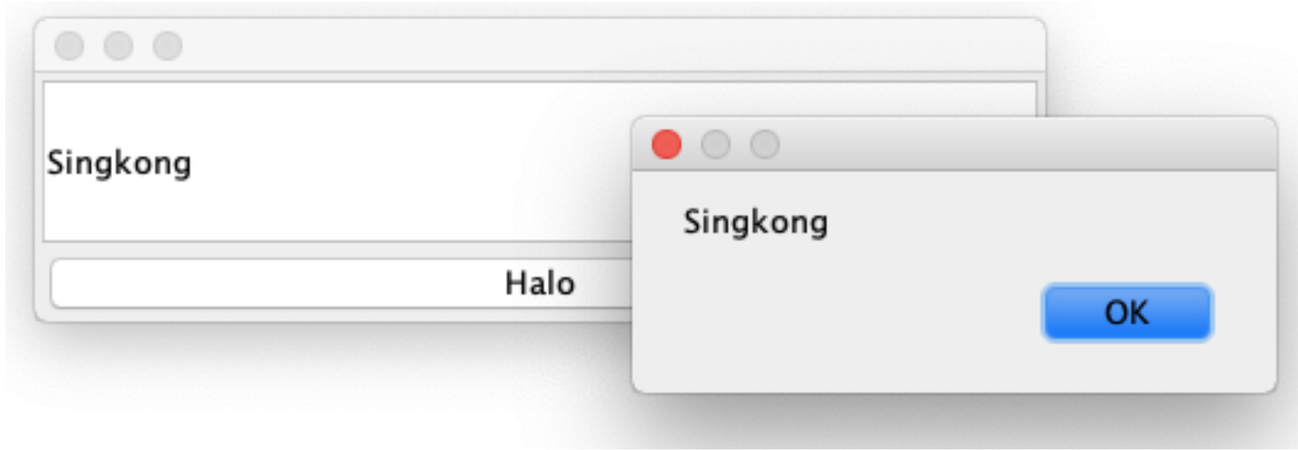
- Antara Bahasa dan Pengembang Program
- Kenapa Singkong
- Passion dan Kolaborasi
- Lampiran: contoh langkah demi langkah: GUI
- Lampiran: contoh langkah demi langkah: Database dan GUI

Antara Bahasa dan Pengembang Program

Bahasa Pemrograman

```
reset()
var e = component("text", "")
var b = component("button", "Halo")
add(e)
add_s(b)

event(b, fn() {
  message(get(e, "contents"))
})

show()
```





Kode sumber program

Melewati proses translasi

Menjadi program yang dapat dijalankan

Antara Bahasa dan Pengembang Program

Hello, World

```c
#include<stdio.h>

int main(void) {
        printf("Hello, World\n");
        return 0;
}
```

C

```java
class Hello {
        public static void main(String[] args) {
                System.out.println("Hello, World");
        }
}
```

Java

```python
print('Hello, World')
```

Python

```
println("Hello, World")
```

Singkong

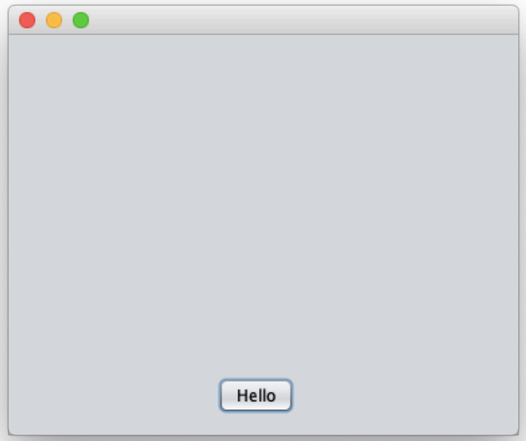
Antara Bahasa dan Pengembang Program

Alat Bantu: Tidak Semua Kode Program Harus Diketik

```
class Hello {
        public static void main(String[] args) {
                System.out.println("Hello, World");
        }
}
```

Java

- **Menggunakan NetBeans**
- New -> Java Class -> Hello
- Di dalam kode class Hello yang dihasilkan:
  - Ketik psvm
  - Tekan <control> <space>
  - Pilih: *public static void main*
  - Tekan Enter
- Dalam kode yang dihasilkan, ketik:
  - System.out.println("Hello, World”);
  - **Hanya mengetik 1 baris kode** (dibantu auto complete)



- **Menggunakan NetBeans**
- New -> JFrame Form -> HelloWorld
- Pada Frame yang tampil, drag Button dari Palette
- Ubah text Button di Properties
- Run File
- **Tanpa mengetik 1 baris kode pun**

Antara Bahasa dan Pengembang Program

Perkembangan: Bahasa-Bahasa Baru Lahir Setiap Dekade

Periode	Jumlah Bahasa Baru	Contoh
Sebelum 1950	>10	
1950-an	~50	FORTRAN, COBOL, LISP
1960-an	~50	BASIC
1970-an	~60	Pascal, C, SQL
1980-an	~60	C++, Perl
1990-an	~70	Python, Java, PHP, JavaScript
2000-an	~50	C#, Go
2010-an	~30	Dart, Swift

'Timeline of programming languages' (2021). Wikipedia. Available at: https://en.wikipedia.org/wiki/Timeline_of_programming_languages (Accessed: 05 March 2021)

Antara Bahasa dan Pengembang Program

Indeks TIOBE: Bahasa-Bahasa Pemrograman Terpopuler (1-10)

Feb 2021	Feb 2020	Bahasa
1	2	C
2	1	Java
3	3	Python
4	4	C++
5	5	C#
6	6	Visual Basic
7	7	JavaScript
8	8	PHP
9	9	SQL
10	12	Assembly

‘TIOBE Index for February 2021’ (2021). TIOBE. Available at: https://www.tiobe.com/tiobe-index/ (Accessed: 05 March 2021)

Antara Bahasa dan Pengembang Program

Indeks TIOBE: Bahasa-Bahasa Pemrograman Terpopuler (11-20)

Feb 2021	Feb 2020	Bahasa
11	13	R
12	26	Groovy
13	11	Go
14	15	Ruby
15	10	Swift
16	16	MATLAB
17	18	Delphi / Object Pascal
18	22	Classic Visual Basic
19	19	Perl
20	20	Objective-C

‘TIOBE Index for February 2021’ (2021). TIOBE. Available at: https://www.tiobe.com/tiobe-index/ (Accessed: 05 March 2021)

Antara Bahasa dan Pengembang Program

Ruang untuk Bahasa Pemrograman Baru

- Menawarkan kelebihan dari bahasa-bahasa yang ada
- **Untuk mendukung end-user programming: kebutuhan personal/hobi atau menyelesaikan pekerjaan**
- Berbagai bahasa yang spesifik untuk domain tertentu (DSL)
- **Mengkombinasikan kelebihan beberapa bahasa ke dalam bahasa yang lebih sederhana**

Kenapa Singkong

Belajar dan Menggunakan Beberapa Bahasa Pemrograman

- Pascal, C, PHP, Python, Java
- Belajar merancang dan mengimplementasikan bahasa domain-spesifik:
  - Perkedel
  - Pangsit
- **Singkong: akhir 2019-sekarang**

> Singkong terinspirasi dari tanaman singkong: tersedia meluas, dapat diolah menjadi berbagai jenis makanan atau dimakan apa adanya, dan terjangkau oleh hampir siapa pun.

Kenapa Singkong

Kebutuhan: Jalan di Sebanyak Mungkin Sistem Operasi (1)

- Harus dapat jalan di sebanyak mungkin sistem operasi
  - macOS® (berbagai versi, termasuk yang terbaru)
  - Windows®: dari Windows 98 sampai Windows terbaru
  - Linux®: yang dirilis awal tahun 2000-an sampai yang terbaru
  - Oracle® Solaris
  - FreeBSD®
  - OpenBSD
  - NetBSD®
  - Haiku®

Sekali ditulis, program yang ditulis dengan Singkong dapat jalan di sebanyak mungkin sistem operasi

Kenapa Singkong

Kebutuhan: Jalan di Sebanyak Mungkin Sistem Operasi (2)

macOS 10.14, 10.15, 11 (Java 8)	Windows 10 (Java 8, 14)	Windows 7 (Java 5.0, 8, 13, 14)	Windows XP (Java 6)
Windows 2000 (Java 5.0)	Windows 98 (Java 5.0)	Ubuntu 20.04, 18.04, 16.04, 4.10 (Java 11, 11, 8, 5.0)	Raspberry Pi OS (Java 8, 11)
Red Hat Linux 7.3 (Java 5.0)	Solaris 11.4 (Java 8)	FreeBSD 12.1 (Java 8)	OpenBSD 6.6 (Java 11)
NetBSD 9.0 (Java 11)	Haiku beta 1 (Java 8)	.NET 3.5 di Windows XP (IKVM.NET 7.2, Java 7)	Debian 10 di Android (Java 11)

Agar dapat dijalankan pada sebanyak mungkin sistem operasi, Singkong ditulis dengan **Java®**

Singkong hanya membutuhkan Java® 5.0 (dan telah diuji pada Java® terbaru, versi 15)

Java® 5.0 dirilis **2004**, **15 tahun sebelum Singkong** mulai dikembangkan

Noprianto. (2021). *Mengenal dan Menggunakan Bahasa Pemrograman Singkong.* Jakarta: PT. Stabil Standar Sinergi, pp.4

Kenapa Singkong

Kebutuhan: Sintaks Sesederhana Mungkin

- Prosedural, *tidak* berorientasi objek
- Tidak membedakan huruf besar dan huruf kecil
- Mendukung fungsi rekursif, first class function, fungsi dalam fungsi

```
var name = "Singkong"
println(NAME)
```

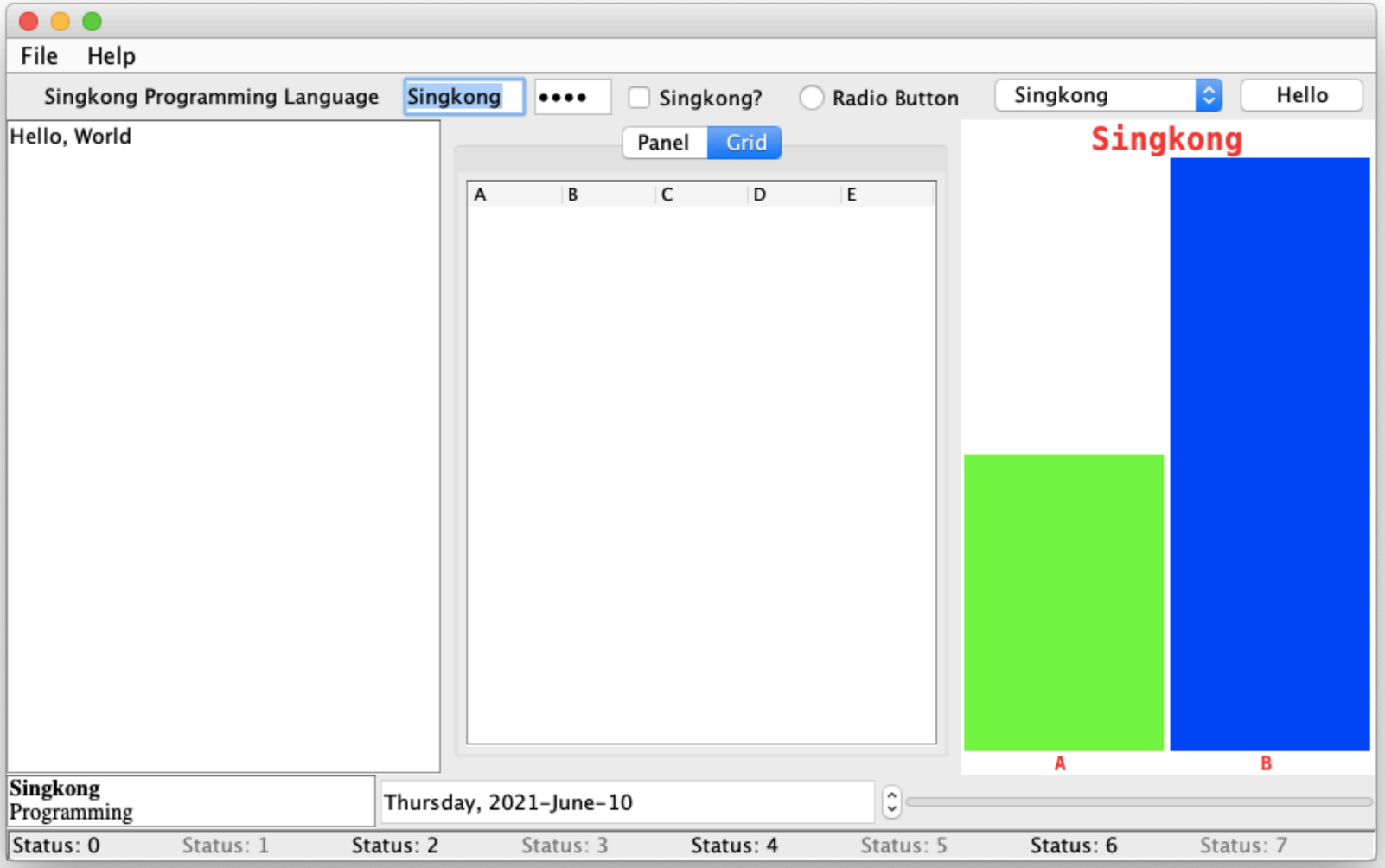
```
var f = fn(x) {
  if (x == 1) {
    1
  } else {
    x * f(x-1)
  }
}
```

```
var f = fn(x) {
  return x
}

var g = fn(x) {
  return x * x
}

var h = f(g)(10)
println(h)
```

```
var a = fn() {
        println("a")
        var b = fn() {
                println("b")
                var c = fn() {
                        println("c")
                        var d = fn() {
                                println("d")
                        }
                        d()
                }
                c()
        }
        b()
}
a()
```

Kenapa Singkong

Kebutuhan: GUI Harus Dapat Dibuat Semudah Mungkin (1)



- Menu bar
- Status bar
- Konfirmasi keluar aplikasi
- Button
- Checkbox
- Combobox
- Date
- Edit
- Image
- Label
- Password
- Progress
- Radio
- Tab
- Panel
- Grid
- Table
- Text
- View
- Barchart

Semua dalam < 48 baris

Kenapa Singkong

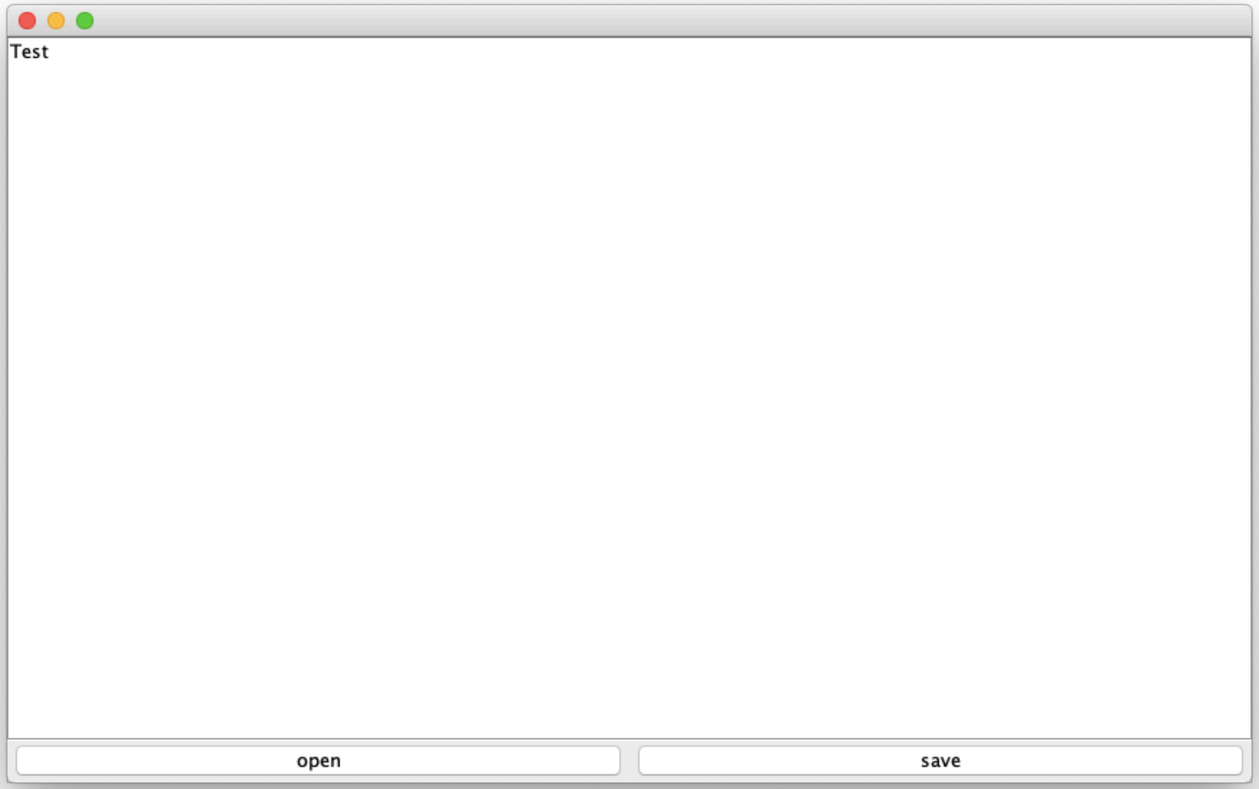
Kebutuhan: GUI Harus Dapat Dibuat Semudah Mungkin (2)

```
reset()
var b = component("button", "Hello")
var c = component("checkbox", "Singkong?")
var m = component("combobox", "Singkong,Programming,Language")
var d = component("date", "EEEE, yyyy-MMMM-dd")
var e = component("edit", "Hello, World")
var i = component("image", "image.jpg")
var l = component("label", "Singkong Programming Language")
var p = component("password", "test")
var g = component("progress", "")
var r = component("radio", "Radio Button")
var a = component("tab", "")
var panel = component("panel", "Panel")
var t1 = component("table", "A,B,C,D,E")
var grid = component("grid", "Grid")
var t2 = component("table", "A,B,C,D,E")
var x = component("text", "Singkong")
var v = component("view", "<b>Singkong</b><br>Programming")

panel_add(panel, t1, 10, 10, 250, 400)
tab_add(a, panel)
grid_add(grid, t2, 0, 0, 1, 1, 1, 1, 3, 0, 5, 5, 5, 5)
tab_add(a, grid)
```

```
var z = component("barchart", "")
config(z, "foreground", "red")
config(z, "background", "white")
config(z, "font", ["monospaced", 1, 20])
config(z, "text", "Singkong")
config(z, "contents", [[10, "A", "green"], [20, "B",
"blue"]])

add([e, a, z])
add_n([i, l, x, p, c, r, m, b])
add_s([v, d, g])

each(range(0,8), fn(e, i) {
        statusbar(e, "Status: " + e, i%2 == 0)
})

menubar([
    ["File", 0, [ ["Quit", 0, true, fn() {frame_close()}] ]],
    ["Help", 0, [ ["About", 0, true, fn()
{message("Singkong")}] ]]
])

closing("Are you sure you want to quit this application?",
  "Please confirm")
show()
```

Kenapa Singkong

Kebutuhan: GUI Harus Dapat Dibuat Semudah Mungkin (3)



- Editor teks sederhana
- Buka/Simpan file

  Semua dalam < 30 baris

```
reset()
var e = component("edit", "")
var o = component("button", "open")
var s = component("button", "save")
var l = component("label", "")

var oo = fn() {
    var f = open()
    if (!empty(f)) {
        config(e, "contents", read(f))
        config(l, "text", f)
    }
}
event(o, oo)

var ss = fn() {
    var f = save()
    if (!empty(f)) {
        var t = get(e, "contents")
        write(f, t)
        config(l, "text", f)
    }
}
event(s, ss)

add_n(l)
add(e)
add_s([o, s])
show()
```

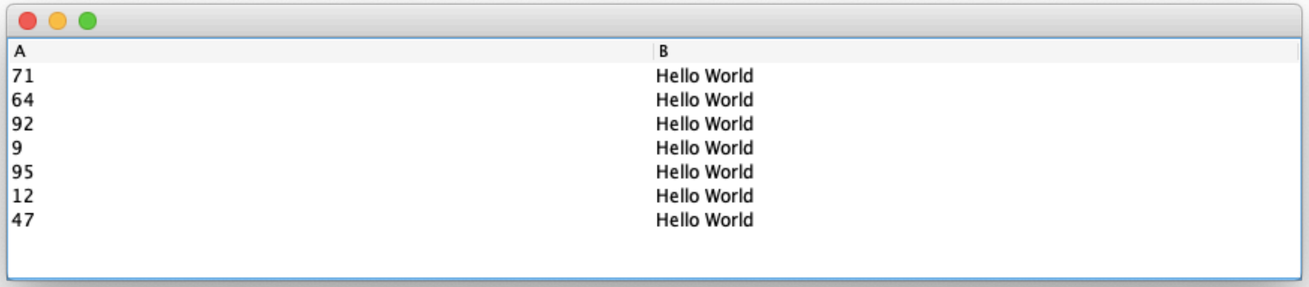
Kenapa Singkong

Kebutuhan: Dukungan Database Relasional (1)

- Koneksi dan query (dengan transaksi) semudah mungkin, dalam masing-masing 1 baris kode
- Database relasional tanpa menggunakan SQL secara langsung
- Bundel JDBC Driver:
  - Apache® Derby: Network Server, Driver (Embedded, Client)
  - PostgreSQL®
- Dapat menggunakan berbagai JDBC Driver lain

Kenapa Singkong

Kebutuhan: Dukungan Database Relasional (2)



- GUI
- Koneksi database
- Query: pembuatan tabel
- Query: insert
- Query: update
- Query: select

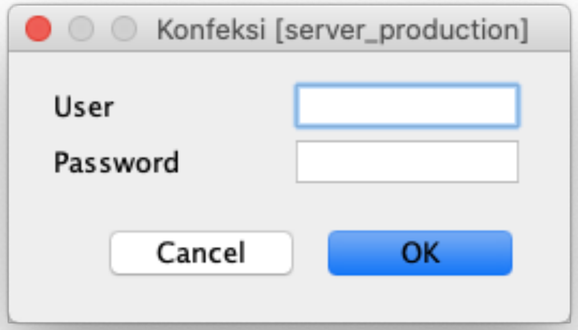
Semua dalam < 25 baris (atau hanya 15 baris dengan modul db_util)

```
load_module("db_util")

reset()
var t = component("table", "A,B", true)
add(t)

var d = db_connect_embed("test")
if (d != null) {
    db_create_table_embed(d, "test", [["a", "integer."], ["b", "varchar."]])

    db_insert(d, "test", {"a": random(0,100), "b": "hello"})
    db_update(d, "test", {"b = ": "hello"}, {"b": "Hello World"})

    var r = db_select_all(d, "test")
    if (!empty(r)) {
        config(t, "contents", r[0])
    }
}

show()
```

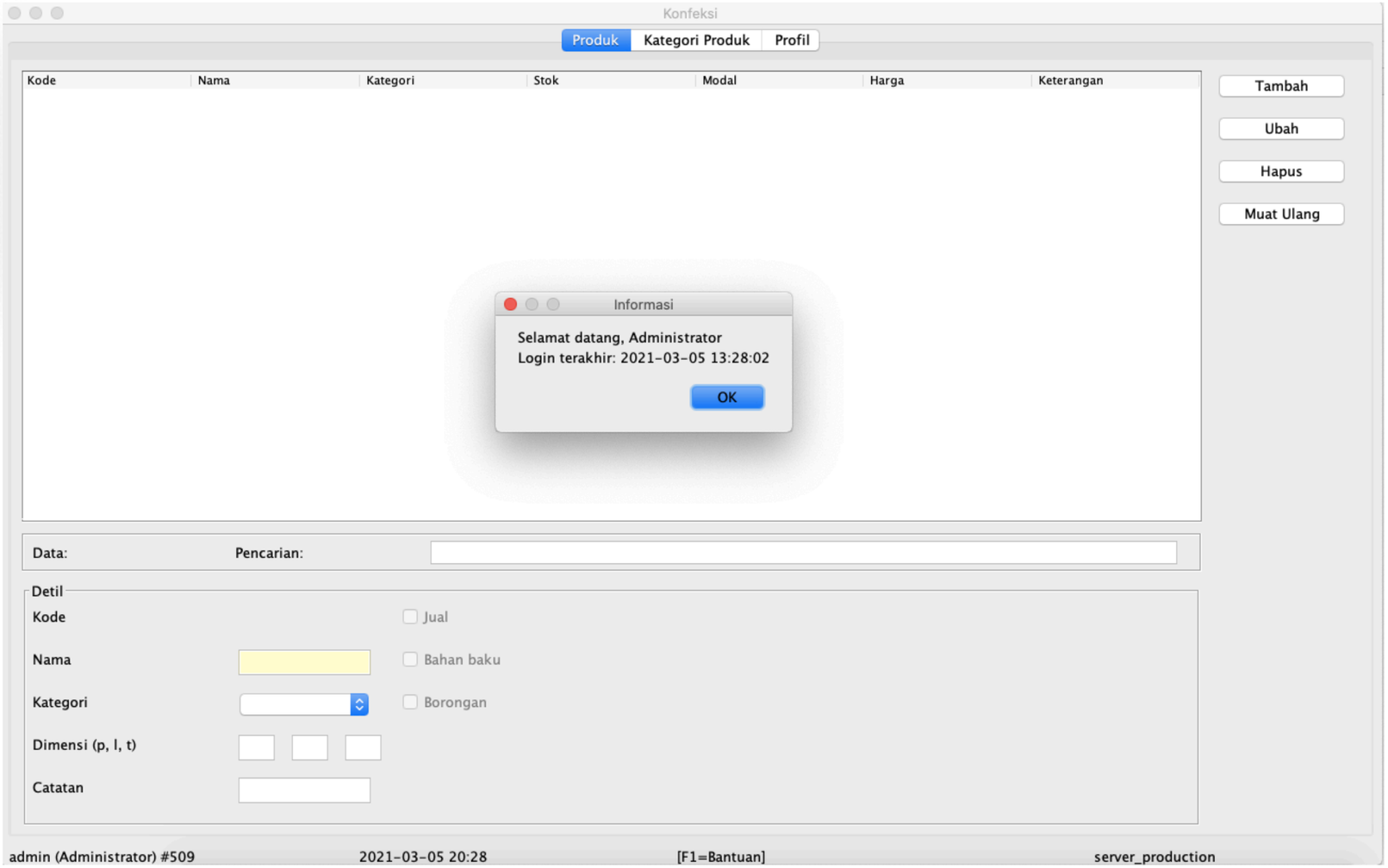
```
reset()
var t = component("table", "A,B", true)
add(t)

var d = database("org.apache.derby.jdbc.EmbeddedDriver", "jdbc:derby:test;create=true", "", "")
if (d != null) {
    var q = [ ["create table test(a integer, b varchar(64))", []] ]
    var r = query(d, q)

    var q = [
        ["insert into test(a,b) values(?, ?)", [random(0,100), "hello"]],
        ["update test set b=? where b=?", ["Hello World", "hello"]]
    ]
    var r = query(d, q)

    var q = [ ["select a,b from test", []] ]
    var r = query(d, q)
    if (!empty(r)) {
        config(t, "contents", r[0])
    }
}

show()
```

Kenapa Singkong

Kebutuhan: HTTP dan Multithreading



- Frontend modul aplikasi konfeksi
- Bekerja dengan HTTP API
- Backend ditulis dengan Singkong
- Komunikasi dengan backend oleh thread tersendiri



Kenapa Singkong

Kebutuhan: Tipe Data Praktis

Tipe Data	Deskripsi	Catatan
NUMBER	Bilangan bulat dan desimal	Batas maksimum tidak ditentukan. Scale 1-16 (default 4). Dapat diterapkan langsung pada aplikasi keuangan dan saintifik. Operator: + - * / == != %(remainder) ^(power) < <= > >=
BOOLEAN	true atau false	
STRING	Data string atau teks	Panjang tidak dibatasi. Diapit dengan kutip ganda. Operator: +(concatenation) -(remove) ==(equals,case-sensitive) != *(repeat)
ARRAY	Array (heterogen, Campur berbagai tipe), array dalam array.	Panjang tidak dibatasi. Termasuk rectangular array. Operator: +(add), -(remove) == !=
HASH	Hash table / dictionary	Jumlah pemetaan tidak dibatasi. Memperhatikan insertion-order. Operator: +(add dictionary), -(remove) == !=
DATE	Tanggal dan Waktu	@ @Y @YY @YYY @YYYY @YYYYM @YYYYMM @YYYYMMD @YYYYMMDD @YYYYMMDDh @YYYYMMDDhh @YYYYMMDDhhm @YYYYMMDDhhmm @YYYYMMDDhhmms @YYYYMMDDhhmmss
FUNCTION	Fungsi	First class. Mendukung documentation string. Mendukung rekursif. Mendukung fungsi dalam fungsi.
BUILTIN	Fungsi bawaan	Menyediakan berbagai fungsionalitas
COMPONENT	Komponen GUI	"barchart", "button", "checkbox", "combobox", "date", "edit", "image", "label", "panel", "password", "progress", "radio", "tab", "table", "text", "view"
DATABASE	Koneksi Database	
NULL	null	

Kenapa Singkong

Kebutuhan: Fungsi dan Modul Bawaan

- Menyediakan berbagai fungsionalitas siap pakai
- Modul bawaan ditulis dengan Singkong
- Fungsi dan modul bawaan akan ditambahkan secara berkala

Singkong v6.2

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Fungsi bawaan

6

Modul bawaan

Kenapa Singkong

Dapat Memanggil Method Java®, Dapat Di-Embed ke Aplikasi Java® (1)

Singkong dapat memanggil method yang ditulis dengan Bahasa Pemrograman Java dan mendapatkan nilai kembalian dari pemanggilan method tersebut.

Dengan demikian, fungsionalitas yang tidak disediakan oleh fungsi built-in dan tidak dapat dibuat dengan kode Singkong saja, dapat ditulis dalam Java.

Noprianto. (2021). *Mengenal dan Menggunakan Bahasa Pemrograman Singkong.* Jakarta: PT. Stabil Standar Sinergi

Kenapa Singkong

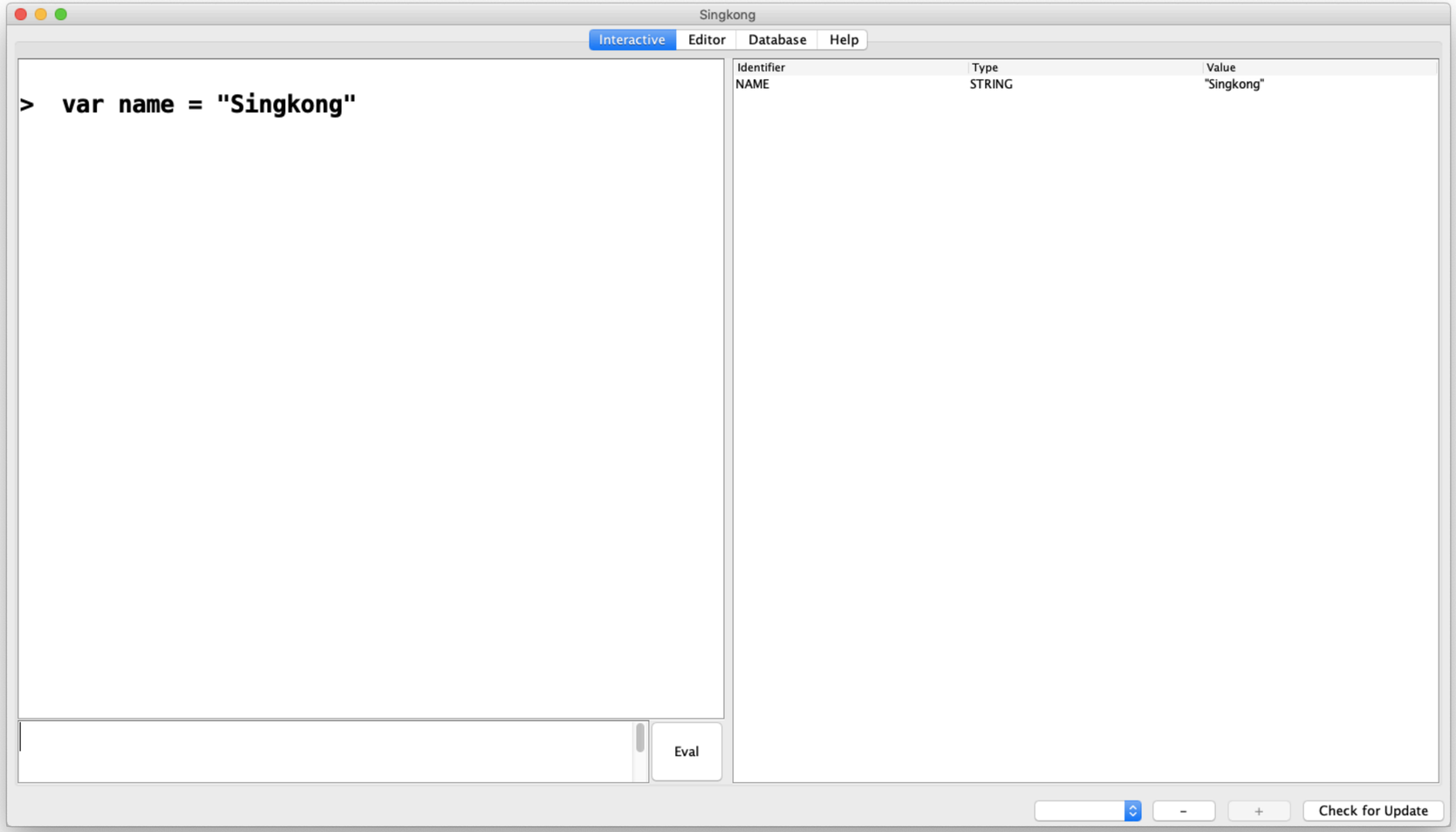
Dapat Memanggil Method Java®, Dapat Di-Embed ke Aplikasi Java® (2)

Apabila diinginkan, programmer Java bisa menambahkan Singkong.jar ke class path dan menggunakan interpreter Singkong untuk menginterpretasikan kode program Singkong, yang mungkin didapatkan dari input user. Singkong dapat berfungsi sebagai scripting engine sederhana dalam hal ini.

Noprianto. (2021). *Mengenal dan Menggunakan Bahasa Pemrograman Singkong.* Jakarta: PT. Stabil Standar Sinergi

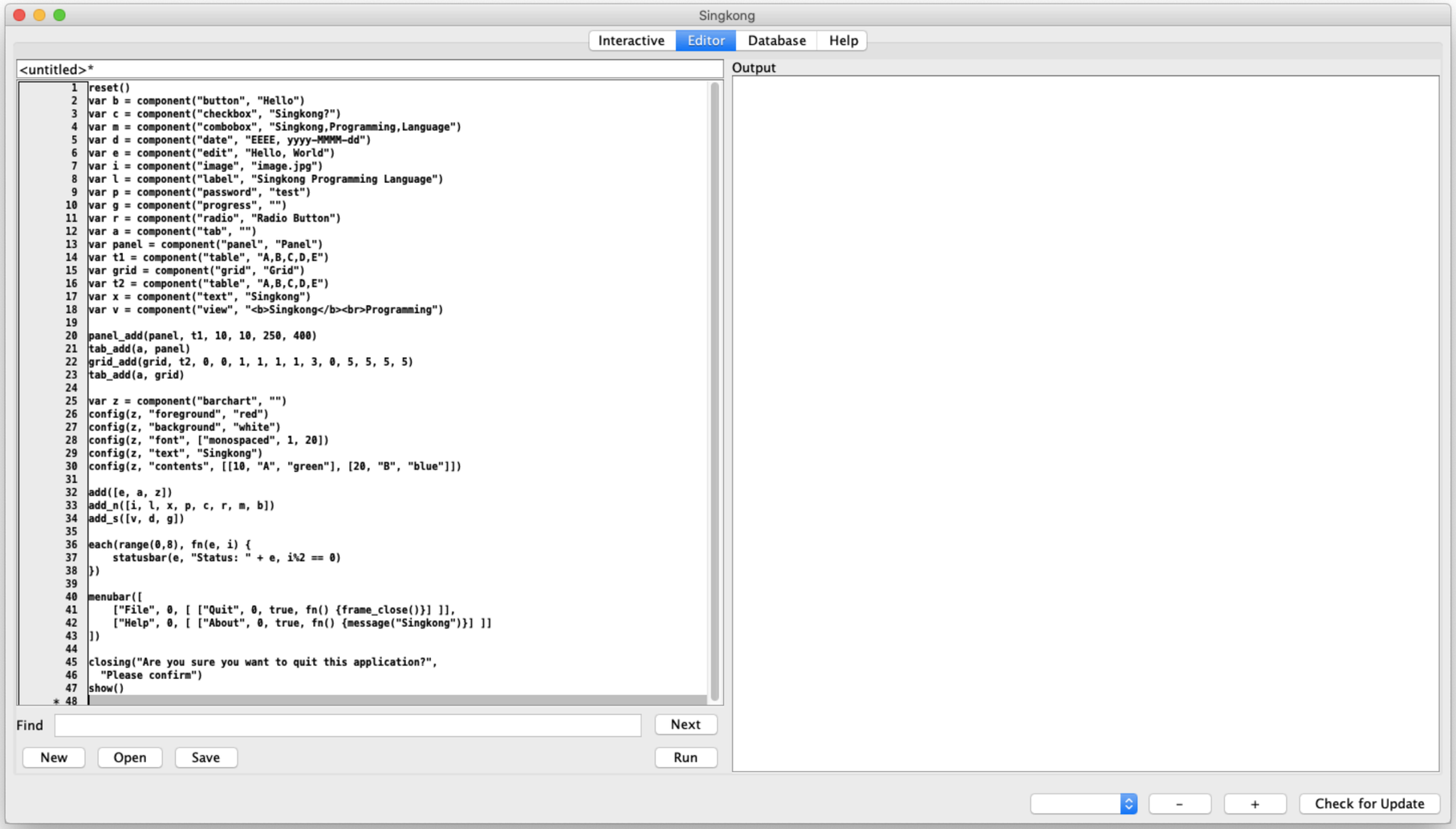
Kenapa Singkong

Singkong.jar (4,3 MB): Evaluator, Editor, Database Tool, Dokumentasi (1)



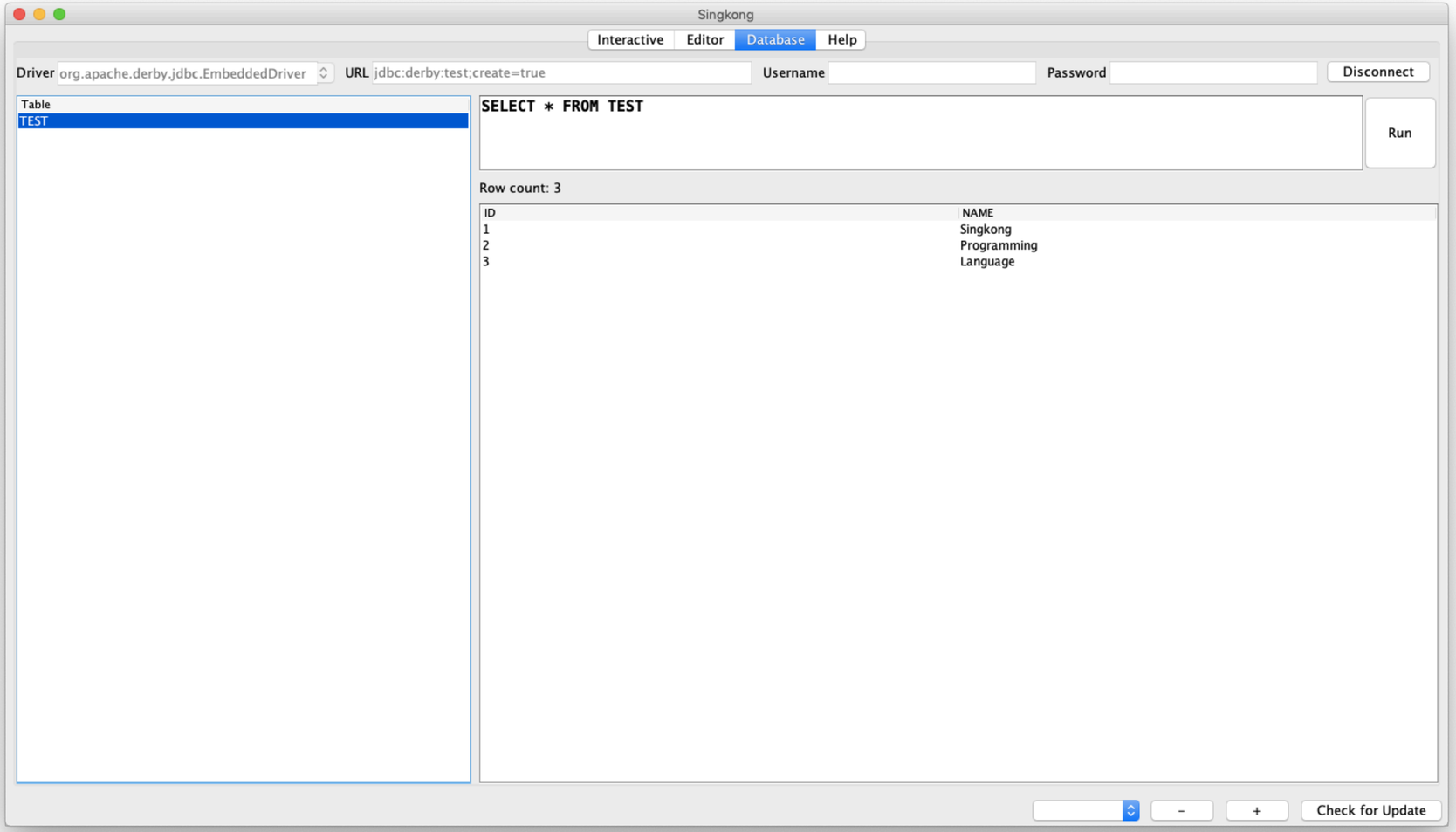
Kenapa Singkong

Singkong.jar (4,3 MB): Evaluator, Editor, Database Tool, Dokumentasi (2)



Kenapa Singkong

Singkong.jar (4,3 MB): Evaluator, Editor, Database Tool, Dokumentasi (3)



Kenapa Singkong

Singkong.jar (4,3 MB): Evaluator, Editor, Database Tool, Dokumentasi (4)

- Bundel bersama JDBC Driver:
  - Apache® Derby: Network Server, Driver (Embedded, Client)
  - PostgreSQL®
- Modul Singkong (ditulis dengan Singkong)

Kenapa Singkong

Buku Singkong: singkong.pdf

- Buku tersedia gratis, ditulis dalam Bahasa Indonesia
- Mencakup semua yang dibutuhkan untuk mempelajari Singkong, termasuk berbagai contoh kode
- Selalu diperbaharui sesuai dengan versi terbaru Singkong (dirilis pada waktu yang sama)
- Buku dalam format siap cetak

Kenapa Singkong

Distribusi Aplikasi Anda Dalam File Jar Tunggal

- Aplikasi yang Anda kembangkan, bersama semua file pendukung (termasuk modul, gambar, suara, class Java), dapat dibundel bersama interpreter Singkong.
  - Menjadi file jar tunggal
  - Selama nama file jar aplikasi Anda tidak mengandung kata “Singkong”
- File jar tunggal tersebut dapat dijalankan di semua sistem operasi yang telah terinstall Java® 5.0 atau lebih baru
  - Secara teknis, Anda dapat pula membundel Java® runtime bersama file jar tunggal aplikasi Anda

Passion dan Kolaborasi

Bahasa Pemrograman Monkey

- Singkong berbasiskan pada Monkey.java (sekitar 3.000 baris kode Java)
  - Monkey.java berbasiskan pada monkey.py (sekitar 2.000 baris kode Python)
  - monkey.py berbasiskan pada kode dalam Bahasa Go, dalam buku: WRITING AN INTERPRETER IN GO
- Tersedia pula implementasi Bahasa Monkey dengan Singkong: monkey.singkong (sekitar 2.100 baris kode Singkong)
- monkey.singkong, Monkey.java, dan monkey.py adalah free/open source dan dapat didownload dari situs web Singkong (https://nopri.github.io)
- Saat ini, source code Singkong (v6.2) telah berukuran lebih dari 9 kali Monkey.java, dalam lebih dari 29.000 baris kode Java dan Singkong

Passion dan Kolaborasi

Sedikit Demi Sedikit

- Dari sekedar proyek hobi, Singkong kini telah menjadi passion, memungkinkan:
  - Singkong telah digunakan di production (backend ataupun frontend)
    - Bug perlu diperbaiki
    - Fungsionalitas tambahan perlu disediakan
  - Beberapa aplikasi berjalan telah/sedang ditulis ulang dengan Singkong
  - Rilis dilakukan berkala
  - Porting beberapa pustaka ke Singkong sedang/akan dilakukan

Passion dan Kolaborasi

Riset dan Pengembangan Bersama

Kategori	Pekerjaan	Deskripsi
Editor	Plugin untuk editor	Editor yang datang bersama Singkong.jar masih sederhana. Selama masih diperlukan, plugin-plugin untuk berbagai editor akan dikerjakan secara kolaboratif.
Bahasa	Bahasa pemrograman baru, kompatibel dengan Singkong	Sintaks pada Singkong tidak akan banyak berubah, untuk menjadikannya tetap sederhana. Berbagai pengembangan lain dapat dilakukan pada bahasa baru yang kompatibel, dengan implementasi free/open source.
Buku	Berbagai buku ilmu komputer	Berbagai topik dengan implementasi dalam Bahasa Singkong. Saat ini, beberapa buku sedang ditulis dan atau dipersiapkan.
Pustaka	Pembuatan atau porting pustaka	Pembuatan pustaka untuk Singkong ataupun porting pustaka yang ditulis dengan bahasa pemrograman lain ke Singkong

Terima Kasih

atas perhatian dan partisipasi Anda :)

Lampiran di halaman berikut >

Contoh: GUI

GUI: 4 baris

```
reset()
title("Matrix")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI

GUI: 10 baris

```
load_module("ui_util")

reset()
var t = component("table", "A,B,C,D,E,F,G,H,I,J")
table_add_fill(t, "")
add(t)

title("Matrix")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI

GUI: 11 baris

```
load_module("ui_util")

reset()
var t = component("table", "A,B,C,D,E,F,G,H,I,J")
var r = component("table", "Property, Value")
table_add_fill(t, "")
add([t, r])

title("Matrix")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI

GUI: 30 baris

```
load_module("ui_util")
load_module("rect_array_util")

var functions = [["Square", is_square_rect_array_of_number],
    ["Diagonal", is_diagonal_rect_array_of_number],
    ["Identity", is_identity_rect_array_of_number],
    ["Upper Triangular", is_upper_triangular_rect_array_of_number],
    ["Lower Triangular", is_lower_triangular_rect_array_of_number],
    ["Zero", is_zero_rect_array_of_number],
    ["Symmetric", is_symmetric_rect_array_of_number],
    ["Add (itself)", add_rect_array_of_number, null],
    ["Subtract (itself)", sub_rect_array_of_number, null],
    ["Multiply (itself)", mul_rect_array_of_number, null],
    ["Trace", trace_rect_array_of_number],
    ["Transpose", transpose_rect_array_of_number],
    ["Determinant", determinant_rect_array_of_number],
    ["Inverse", inverse_rect_array_of_number]]

reset()
var t = component("table", "A,B,C,D,E,F,G,H,I,J")
var r = component("table", "Property, Value")
each(functions, fn(e, i) {
    table_add(r, [[e[0]]])
})
table_add_fill(t, "")
add([t, r])

title("Matrix")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI

GUI: 35 baris

```
load_module("ui_util")
load_module("rect_array_util")

var functions = [["Square", is_square_rect_array_of_number],
    ["Diagonal", is_diagonal_rect_array_of_number],
    ["Identity", is_identity_rect_array_of_number],
    ["Upper Triangular", is_upper_triangular_rect_array_of_number],
    ["Lower Triangular", is_lower_triangular_rect_array_of_number],
    ["Zero", is_zero_rect_array_of_number],
    ["Symmetric", is_symmetric_rect_array_of_number],
    ["Add (itself)", add_rect_array_of_number, null],
    ["Subtract (itself)", sub_rect_array_of_number, null],
    ["Multiply (itself)", mul_rect_array_of_number, null],
    ["Trace", trace_rect_array_of_number],
    ["Transpose", transpose_rect_array_of_number],
    ["Determinant", determinant_rect_array_of_number],
    ["Inverse", inverse_rect_array_of_number]]

reset()
var t = component("table", "A,B,C,D,E,F,G,H,I,J")
var r = component("table", "Property, Value")
each(functions, fn(e, i) {
    table_add(r, [[e[0]]])
})
table_add_fill(t, "")
add([t, r])

var b = component("button", "Run")
event(b, fn() {
})
add_s(b)

title("Matrix")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI

GUI: 53 baris

```
load_module("ui_util")
load_module("rect_array_util")

var functions = [["Square", is_square_rect_array_of_number],
    ["Diagonal", is_diagonal_rect_array_of_number],
    ["Identity", is_identity_rect_array_of_number],
    ["Upper Triangular", is_upper_triangular_rect_array_of_number],
    ["Lower Triangular", is_lower_triangular_rect_array_of_number],
    ["Zero", is_zero_rect_array_of_number],
    ["Symmetric", is_symmetric_rect_array_of_number],
    ["Add (itself)", add_rect_array_of_number, null],
    ["Subtract (itself)", sub_rect_array_of_number, null],
    ["Multiply (itself)", mul_rect_array_of_number, null],
    ["Trace", trace_rect_array_of_number],
    ["Transpose", transpose_rect_array_of_number],
    ["Determinant", determinant_rect_array_of_number],
    ["Inverse", inverse_rect_array_of_number]]

var get_matrix = fn(a) {
    var ret = []
    each(a, fn(e, i) {
        var row = []
        each(e, fn(ee, ii) {
            var ee_ = trim(ee)
            if (!empty(ee_)) {
                var row = row + number(ee_)
            }
        })
        if (!empty(row)) {
            var ret = ret + row
        }
    })
    return ret
}

reset()
var t = component("table", "A,B,C,D,E,F,G,H,I,J")
var r = component("table", "Property, Value")
each(functions, fn(e, i) {
    table_add(r, [[e[0]]])
})
table_add_fill(t, "")
add([t, r])

var b = component("button", "Run")
event(b, fn() {
    var m = get_matrix(get(t, "contents"))
})
add_s(b)

title("Matrix")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI

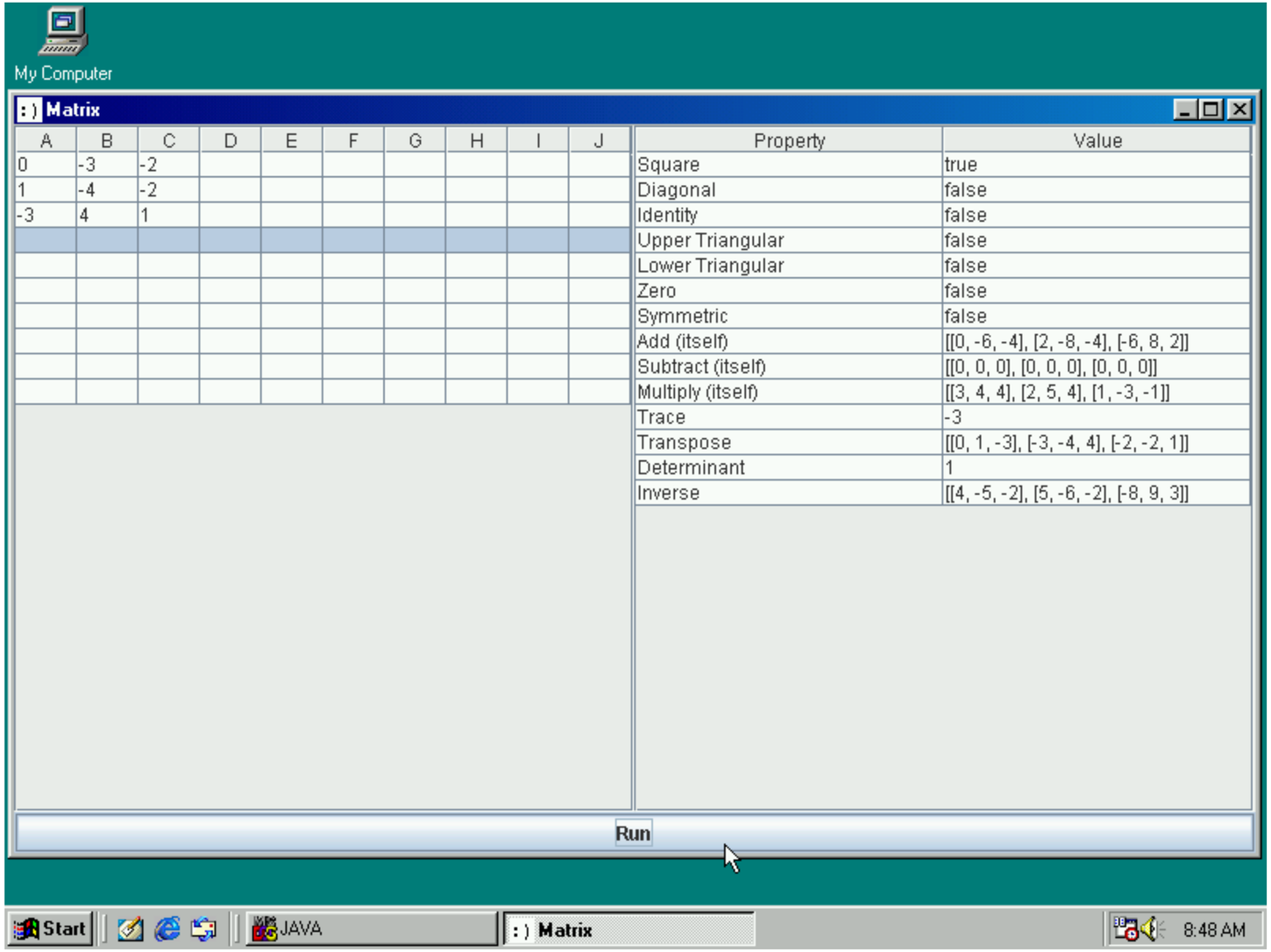
GUI: 61 baris

```
load_module("ui_util")
load_module("rect_array_util")

var functions = [["Square", is_square_rect_array_of_number],
    ["Diagonal", is_diagonal_rect_array_of_number],
    ["Identity", is_identity_rect_array_of_number],
    ["Upper Triangular", is_upper_triangular_rect_array_of_number],
    ["Lower Triangular", is_lower_triangular_rect_array_of_number],
    ["Zero", is_zero_rect_array_of_number],
    ["Symmetric", is_symmetric_rect_array_of_number],
    ["Add (itself)", add_rect_array_of_number, null],
    ["Subtract (itself)", sub_rect_array_of_number, null],
    ["Multiply (itself)", mul_rect_array_of_number, null],
    ["Trace", trace_rect_array_of_number],
    ["Transpose", transpose_rect_array_of_number],
    ["Determinant", determinant_rect_array_of_number],
    ["Inverse", inverse_rect_array_of_number]]

var get_matrix = fn(a) {
    var ret = []
    each(a, fn(e, i) {
        var row = []
        each(e, fn(ee, ii) {
            var ee_ = trim(ee)
            if (!empty(ee_)) {
                var row = row + number(ee_)
            }
        })
        if (!empty(row)) {
            var ret = ret + row
        }
    })
    return ret
}

reset()
var t = component("table", "A,B,C,D,E,F,G,H,I,J")
var r = component("table", "Property, Value")
each(functions, fn(e, i) {
    table_add(r, [[e[0]]])
})
table_add_fill(t, "")
add([t, r])

var b = component("button", "Run")
event(b, fn() {
    var m = get_matrix(get(t, "contents"))
    config(r, "contents", [])
    each(functions, fn(e, i) {
        if (len(e) == 3) {
            table_add(r, [[e[0], e[1](m, m)]])
        } else {
            table_add(r, [[e[0], e[1](m)]])
        }
    })
})
add_s(b)

title("Matrix")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI

GUI: Matriks

Sekali ditulis, program yang ditulis dengan Singkong dapat jalan di sebanyak mungkin sistem operasi



Contoh: GUI dan Database

GUI dan Database: 4 baris

```
reset()
title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 10 baris

```
reset()
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)

add(t)

title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 18 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}

reset()
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)

add(t)

title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 19 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}
db_create_table_embed(d, "products", [["id", "id"], ["name", "varchar."], ["price", "decimal."]])

reset()
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)

add(t)

title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 32 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}
db_create_table_embed(d, "products", [["id", "id"], ["name", "varchar."], ["price", "decimal."]])

var reload = fn() {
    config(t, "contents", [])
    var r = query_result(db_select_all(d, "products"))
    var rr = []
    if (r != null) {
        each(r, fn(e, i) {
            var rr = rr + [e[0], e[1], number_group(e[2], ",", ".")]
        })
    }
    config(t, "contents", rr)
}

reset()
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)

add(t)

reload()
title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 38 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}
db_create_table_embed(d, "products", [["id", "id"], ["name", "varchar."], ["price", "decimal."]])

var reload = fn() {
    config(t, "contents", [])
    var r = query_result(db_select_all(d, "products"))
    var rr = []
    if (r != null) {
        each(r, fn(e, i) {
            var rr = rr + [e[0], e[1], number_group(e[2], ",", ".")]
        })
    }
    config(t, "contents", rr)
}

reset()
var g = component("grid", "")
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)
var b_new = component("button", "New")
var b_del = component("button", "Delete")
grid_add(g, t, 0, 0, 3, 1, 1.0, 1.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_new, 0, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_del, 1, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)

add(g)

reload()
title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 52 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}
db_create_table_embed(d, "products", [["id", "id"], ["name", "varchar."], ["price", "decimal."]])

var reload = fn() {
    config(t, "contents", [])
    var r = query_result(db_select_all(d, "products"))
    var rr = []
    if (r != null) {
        each(r, fn(e, i) {
            var rr = rr + [e[0], e[1], number_group(e[2], ",", ".")]
        })
    }
    config(t, "contents", rr)
}

reset()
var g = component("grid", "")
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)
var b_new = component("button", "New")
var b_del = component("button", "Delete")
grid_add(g, t, 0, 0, 3, 1, 1.0, 1.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_new, 0, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_del, 1, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
```

```
var g_detail = component("grid", "")
config(g_detail, "border", "Detail")
var l_name = component("label", "Name")
var t_name = component("text", "")
var l_price = component("label", "Price")
var t_price = component("text", "")
var b_save = component("button", "Save")
grid_add(g_detail, l_name, 0, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_name, 1, 0, 1, 1, 1.0, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, l_price, 2, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_price, 3, 0, 1, 1, 0.1, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, b_save, 4, 0, 1, 1, 0.0, 0.5, 1, 1, 5, 5, 5, 5)

grid_add(g, g_detail, 0, 2, 3, 1, 1.0, 0.0, 3, 0, 5, 5, 5, 5)
add(g)

reload()
title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 58 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}
db_create_table_embed(d, "products", [["id", "id"], ["name", "varchar."], ["price", "decimal."]])

var reload = fn() {
    config(t, "contents", [])
    var r = query_result(db_select_all(d, "products"))
    var rr = []
    if (r != null) {
        each(r, fn(e, i) {
            var rr = rr + [e[0], e[1], number_group(e[2], ",", ".")]
        })
    }
    config(t, "contents", rr)
}

reset()
var g = component("grid", "")
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)
var b_new = component("button", "New")
var b_del = component("button", "Delete")
grid_add(g, t, 0, 0, 3, 1, 1.0, 1.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_new, 0, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_del, 1, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
var g_detail = component("grid", "")
config(g_detail, "border", "Detail")
var l_name = component("label", "Name")
var t_name = component("text", "")
var l_price = component("label", "Price")
var t_price = component("text", "")
var b_save = component("button", "Save")
grid_add(g_detail, l_name, 0, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_name, 1, 0, 1, 1, 1.0, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, l_price, 2, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_price, 3, 0, 1, 1, 0.1, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, b_save, 4, 0, 1, 1, 0.0, 0.5, 1, 1, 5, 5, 5, 5)

grid_add(g, g_detail, 0, 2, 3, 1, 1.0, 0.0, 3, 0, 5, 5, 5, 5)
add(g)

event(b_new, fn() {
    config(t_name, "contents", "")
    config(t_price, "contents", "")
    config(t_name, "focus", true)
})

reload()
title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: 76 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}
db_create_table_embed(d, "products", [["id", "id"], ["name", "varchar."], ["price", "decimal."]])

var reload = fn() {
    config(t, "contents", [])
    var r = query_result(db_select_all(d, "products"))
    var rr = []
    if (r != null) {
        each(r, fn(e, i) {
            var rr = rr + [e[0], e[1], number_group(e[2], ",", ".")]
        })
    }
    config(t, "contents", rr)
}

reset()
var g = component("grid", "")
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)
var b_new = component("button", "New")
var b_del = component("button", "Delete")
grid_add(g, t, 0, 0, 3, 1, 1.0, 1.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_new, 0, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_del, 1, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
```

```
var g_detail = component("grid", "")
config(g_detail, "border", "Detail")
var l_name = component("label", "Name")
var t_name = component("text", "")
var l_price = component("label", "Price")
var t_price = component("text", "")
var b_save = component("button", "Save")
grid_add(g_detail, l_name, 0, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_name, 1, 0, 1, 1, 1.0, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, l_price, 2, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_price, 3, 0, 1, 1, 0.1, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, b_save, 4, 0, 1, 1, 0.0, 0.5, 1, 1, 5, 5, 5, 5)

grid_add(g, g_detail, 0, 2, 3, 1, 1.0, 0.0, 3, 0, 5, 5, 5, 5)
add(g)

event(b_new, fn() {
    config(t_name, "contents", "")
    config(t_price, "contents", "")
    config(t_name, "focus", true)
})

event(b_save, fn() {
    var n = trim(get(t_name, "contents"))
    var p = get(t_price, "contents")
    var pp = number(p)
    var fp = number_group(pp, ",", ".")
    if (empty(n)) {
        message("Please fill in product name", "Error")
    } else {
        var w = fp + newline() + words_en(p) + newline() + words_id(p)
        var x = n + newline() + w
        var conf = confirm("Are you sure you want to add: " + x , "Please Confirm")
        if (conf == "OK") {
            var res = db_insert(d, "products", {"name": n, "price": pp})
            reload()
        }
    }
})

reload()
title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

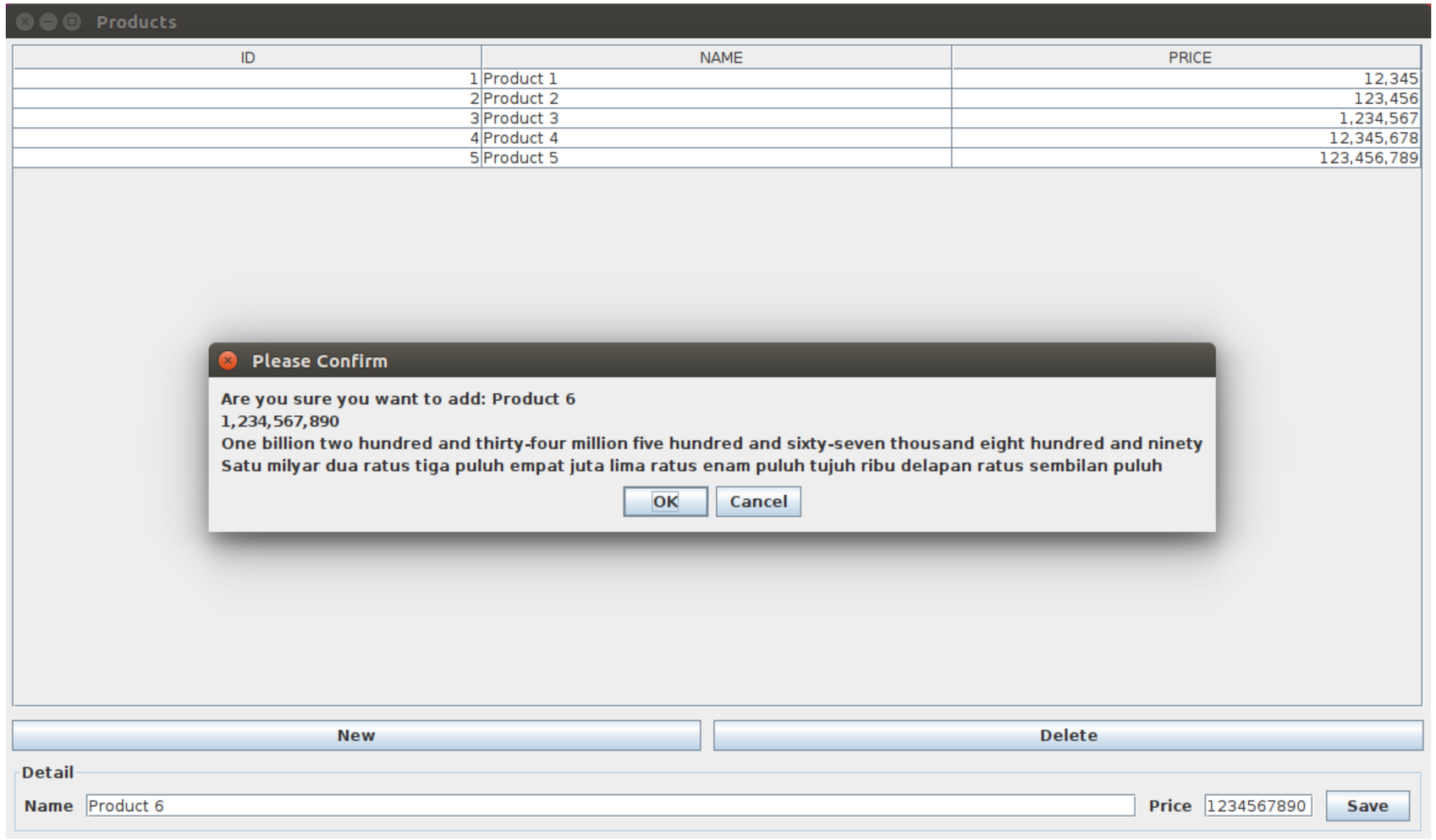
Contoh: GUI dan Database

GUI dan Database: 90 baris

```
load_module("db_util")

var d = db_connect_embed("database_test")
if (d == null) {
    message("Cannot connect to database", "Error")
    exit()
}
db_create_table_embed(d, "products", [["id", "id"], ["name", "varchar."], ["price", "decimal."]])

var reload = fn() {
    config(t, "contents", [])
    var r = query_result(db_select_all(d, "products"))
    var rr = []
    if (r != null) {
        each(r, fn(e, i) {
            var rr = rr + [e[0], e[1], number_group(e[2], ",", ".")]
        })
    }
    config(t, "contents", rr)
}

reset()
var g = component("grid", "")
var t = component("table", "ID, NAME, PRICE")
table_right(t, 0)
table_right(t, 2)
var b_new = component("button", "New")
var b_del = component("button", "Delete")
grid_add(g, t, 0, 0, 3, 1, 1.0, 1.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_new, 0, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)
grid_add(g, b_del, 1, 1, 1, 1, 0.5, 0.0, 3, 0, 5, 5, 5, 5)

var g_detail = component("grid", "")
config(g_detail, "border", "Detail")
var l_name = component("label", "Name")
var t_name = component("text", "")
var l_price = component("label", "Price")
var t_price = component("text", "")
var b_save = component("button", "Save")
grid_add(g_detail, l_name, 0, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_name, 1, 0, 1, 1, 1.0, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, l_price, 2, 0, 1, 1, 0.0, 0.5, 0, 1, 5, 5, 5, 5)
grid_add(g_detail, t_price, 3, 0, 1, 1, 0.1, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g_detail, b_save, 4, 0, 1, 1, 0.0, 0.5, 1, 1, 5, 5, 5, 5)
grid_add(g, g_detail, 0, 2, 3, 1, 1.0, 0.0, 3, 0, 5, 5, 5, 5)
add(g)

event(b_new, fn() {
    config(t_name, "contents", "")
    config(t_price, "contents", "")
    config(t_name, "focus", true)
})

event(b_save, fn() {
    var n = trim(get(t_name, "contents"))
    var p = get(t_price, "contents")
    var pp = number(p)
    var fp = number_group(pp, ",", ".")
    if (empty(n)) {
        message("Please fill in product name", "Error")
    } else {
        var w = fp + newline() + words_en(p) + newline() + words_id(p)
        var x = n + newline() + w
        var conf = confirm("Are you sure you want to add: " + x , "Please Confirm")
        if (conf == "OK") {
            var res = db_insert(d, "products", {"name": n, "price": pp})
            reload()
        }
    }
})

event(b_del, fn() {
    var s = get(t, "active")
    if (s > -1) {
        var x = table_get_value(t, s, 0)
        var conf = confirm("Are you sure you want to delete: #" + x , "Please Confirm")
        if (conf == "OK") {
            db_delete(d, "products", {"id=": x})
            reload()
        }
    } else {
        message("Please select a product", "Error")
    }
})

reload()
title("Products")
closing("Are you sure you want to quit this application?", "Please confirm")
show()
```

Contoh: GUI dan Database

GUI dan Database: Select / Insert / Delete



Sekali ditulis, program yang ditulis dengan Singkong dapat jalan di sebanyak mungkin sistem operasi