



# Probayes



## Bayesian Keystroke Dynamics Solution

July 2009



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# Company

- Founded in 2003 – Based in France (Grenoble)
- Spin-off of a well-known lab (INRIA/CNRS)
  
- Staffing: 20 people
- Profitable since inception
  
- Private held by founders & employees



# Mission Statement

Provide Behavior prediction solution when

- Uncertainty or incompleteness around data
- Uncertainty or incompleteness with models

Based upon

- Reliable & efficient mathematic models
- Translation of “human expert knowledge”
- Automatic self-learning

**➔ PREDICT BEHAVIORS (process, objects, humans, ..)**



# A unique approach

## ◆ Mixing:

- ◆ Modeling Uncertainty
- ◆ Modeling Knowledge (formal or informal)
- ◆ Data

## ◆ Based upon powerful mathematical tools:

- ◆ Bayes Networks, Hidden Markov Chain, ..

**KNOWLEDGE+ MODEL+ DATA= ++ RELEVANCY++**



# Bayesian Models

- Bayesian networks is a newer AI technology that enables one to reason in complex situations with many confusing, uncertain and conflicting sources of information
- A Bayesian network consists of a number of events that may be observed, and at any time a calculation can be made to find the probabilities of the non-observed events based on the available information.
- Bayesian networks are mathematically proven to be correct – even in very complex situation



# What is Keystroke Dynamics ?

Use **manner and rhythm** a person types characters on **Keyboard** or keypad to **discriminate and identify the person**

All the more true when using personal information

---> Identifiers

---> First/Last Name, birthdate





# What is KD useful for ?

- To access an application, to unlock a security token, not only you need to know the key (identifiers, pin, etc), but you need to know the way to key in the information !
- **Keystroke Dynamics efficiently protect against:**
  - **Identity sharing:**  
Prevent people from easily sharing critical identifiers
  - **Identity theft:**  
More info to steal, even so difficult to reproduce the keying

**➔ Nice and efficient add-on for existing security solutions**



# What are the challenges ?

To be useful you need accuracy, i.e:

- **High recognition rate**

At least recognize the person when it is the right person !

- **Low false rejection rate**

Do not deny access to the correct user !

- **Low false acceptance rate**

Do not grant access to the wrong person !

- **But you need to cope with variations when keying from the same user ...**

**➔ Difficult to achieve with classical approaches**



# Why Probayes in KD ?

- Keystroke Dynamics (KD) is perfect fit for Bayesian Network technology as you need:
  - Learning, Modeling, Scoring
- in order to achieve
  - the highest recognition rates
  - The lowest false rejection/acceptance rate

**—————▶ Leverage Probayes's patents**





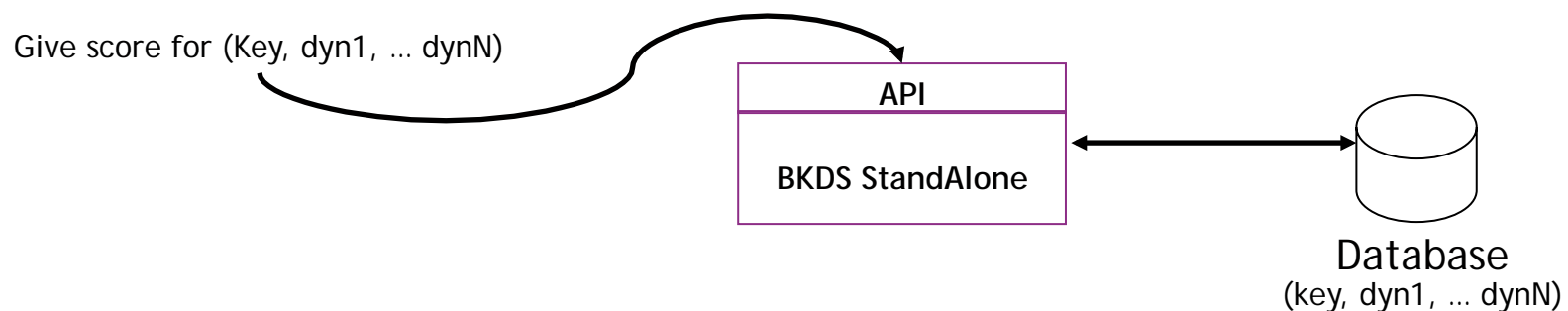
# Probayes KD Product Line

- **BKDS Standalone**
  - Add KD to your application, web site, etc
- **BKDS Inflight**
  - Appliance for on the fly capture & analysis
- **BKDS SaaS (Q4 2009)**
  - Use KD as web service for your web application



# BKDS StandAlone

- Your application captures keystroke dynamics
- Thru simple API, you ask BKDS for a score
- Based on score you decide:
  - To grant access;
  - To deny access;
  - To modify application behaviors or rights



# BKDS Web site integration

Capture keystroke dynamics in the login page with javascript/java  
(BKDS provides sample javascript)

Send keystroke dynamics in the https form to web site

Verify correctness of user/password in web site

If OK, then call BKDS for a score with the captured dynamics

BKDS computes the score based on bayesian model

BKDS returns a score

With the score you decide (grant, deny, restrict) !!

 **EASY AND FAST AND SIMPLE BUT GREAT VALUE !**





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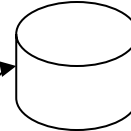
# Sample Architecture

Script for capturing  
(User + password) dynamics



https

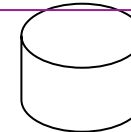
Identity Database  
(key, login, password, etc)



key, dyn1, ... dynN

Web  
Application

API  
BKDS StandAlone



Depending on score:  
Access, Deny, Restrict

score

Database  
(key, dyn1, ... dynN)

Your Web Application

BKDS  
StandAlone



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# BKDS SaaS

## BKDS SaaS= Software As A Service

Same functions as BKDS StandAlone but run on **Cloud Computing**

Web Service Available for you to use

As simple as integrating GoogleMaps

### Advantages:

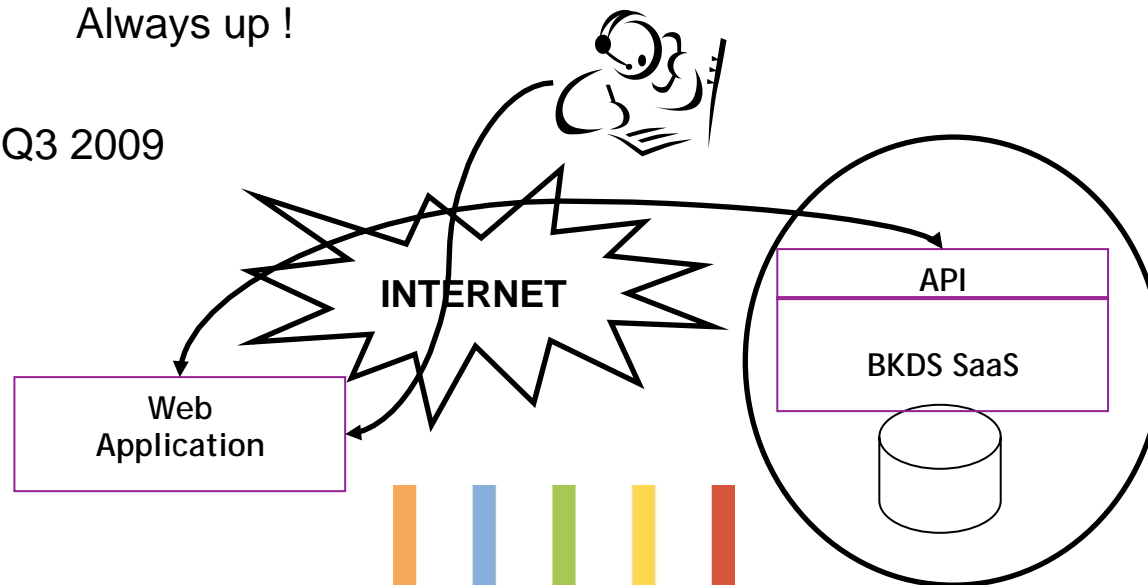
No Software at all to install

No administration (maintenance, backup, etc)

Secure

Always up !

Availability Q3 2009



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# BKDS InFlight

## Partnership with Radware

- Radware Inflight is a high throughput appliance for network monitoring
- BKDS Inflight is a Add-On for Radware InFlight Appliance

## Generate a score

- Seamlessly to user and application
- for all login and login attempts

## Use the score for

- Audit Trail
- Dynamically re-routing suspect or strange traffic





# Benefits

## Simplicity

- Do not change the « user experience »
- Do not require additional infrastructure or token

## Easy Integration

- No impact on the protected application
- Different integration schema covered by BKDS

## Flexibility

- BKDS computes a score, up to the application to decide
- Explicit or on the fly learning

## Accuracy

- Probabilistic models for efficiency and accuracy
- Probayes expertise in mastering uncertainty

## Security

- Increase Protection against identity sharing and identity theft
- BKDS products do not manipulate critical information





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# Give it a try !

**Go and check:**

<http://www.keystroke-dynamics.com>

**Identifier:**

login: web

password: web4you

## Have fun !!



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