

**Bachelor Thesis**

# **Password-Authenticated Key Exchange (PAKE)**

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# Specification

## Context

Password-authenticated key exchange (PAKE) are very powerful cryptographic primitive. They allow a server to share a key with a client or to authenticate a client without having to know or to store his password. For this reason, they provide better security guarantees for initializing a secure connection using password than usual mechanism where the password is transmitted to the server and then compared to a hash. Despite its theoretical superiority, PAKEs are not implemented enough in the industry. Many old PAKEs were patented or got broken which might have hurt the adoption of this primitive.

## Goals

1. Outline existing PAKE. This includes SRP, OPAQUE, KHAPE, EKE, OKE, EKE variants (PAK, PPK, PAK-X,), SNAPI and PEKEP. Also look for other less known PAKEs.
2. Study in detail the main PAKE — EKE, SRP, OPAQUE, KHAPE — and understand their differences.
3. Choose one of the modern PAKEs to implement. The choice is based on the properties of the PAKE, the existence of implementations for this PAKE and the existence of standards for this PAKE.
4. Design an interesting use case where using a PAKE is more appropriate than using a classical authentication method. The advantages of the PAKE are detailed in the report.
5. Implement the chosen PAKE and the use case using the desired programming language

## Deliverables

- Implementation of the chosen PAKE with the use case
- Report containing :
  - PAKEs' state of the art,
  - Description of the use case,
  - Advantages of using a PAKE over a classical authentication method for this use case,
  - Implementation details

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# 1 | Introduction

## 1.1 Problematic

## 1.2 Generalities





## 2 | State of the art



## 3 | Conclusion



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