TECP – Tutorial Environment for Cryptographic Protocols

Jelena Zaitseva

Institute of Computer Science, University of Tartu

Why?

- Cryptography is taught and studied at universities
- There is almost no educational software for such courses covering public key cryptography

Problem Formulation 1

Tutorial environment must

- enable visualization of protocols, including values of secret parameters and intermediate results (all values can be arbitrary large),
- allow adding/removing communicating parties,
- allow adding/editing/sending/removing arbitrary parameters,
- handle number-theoretic and cryptographic primitives

Problem Formulation 2

Analyzed protocols:

- Diffie-Hellman key exchange algorithm
- RSA signatures and encryption schemes
- Rabin public key encryption scheme
- ElGamal signature and encryption schemes
- DSA
- Chaum's blind signature scheme

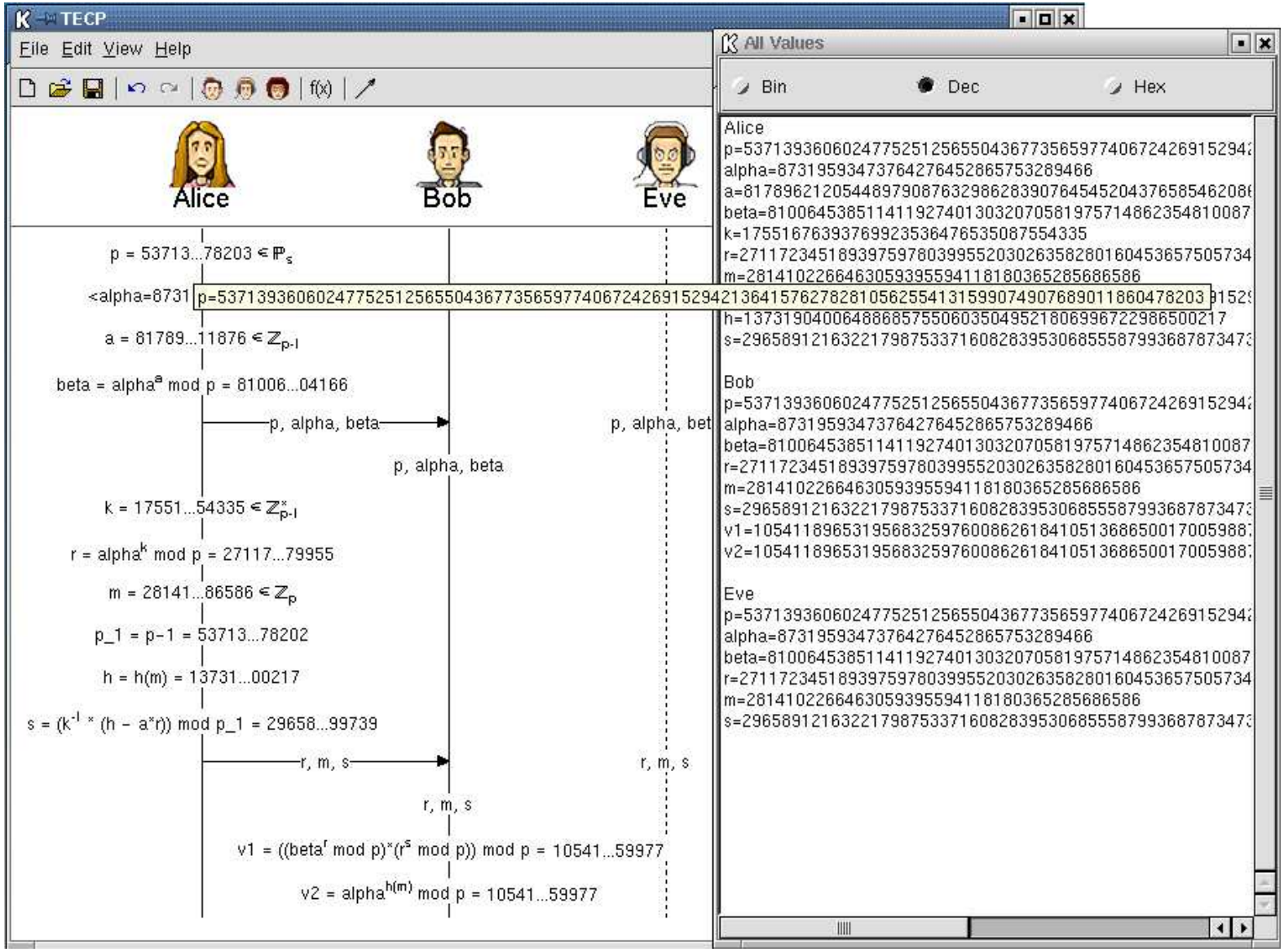
Problem Formulation 3

Required mathematical operations:

- calculation
  - $a \bmod b$, $a - b$, $a + b$, $a \cdot b$, a/b, a^b,
  - $a^b \bmod n$ (-1 can also be a value of b),
  - $\gcd(a, b)$,
  - hash value of m,
- generation and verification
  - prime numbers,
  - number from $\mathbb{Z}_n$ ($\mathbb{Z}_n^*$),
  - generator of $\mathbb{Z}_n^*$
  - number congruent to $a \bmod b$,

where a, b, n and m are some positive integers

Overview of TECP



Implementation

- Borland ®Kylix ™ 3 Open Edition, Borland ®Delphi ™ 6 Personal Edition
- FGInt
- TParser 10.1

Demo

Conclusion

TECP can be used in the following ways:

- visual aid
- tool for experementing with protocols
- modular arithmetic operations calculator
- problem generator

Thank You for Your attention!