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Security-Preserving Support Vector Machine with Fully Homomorphic Encryption

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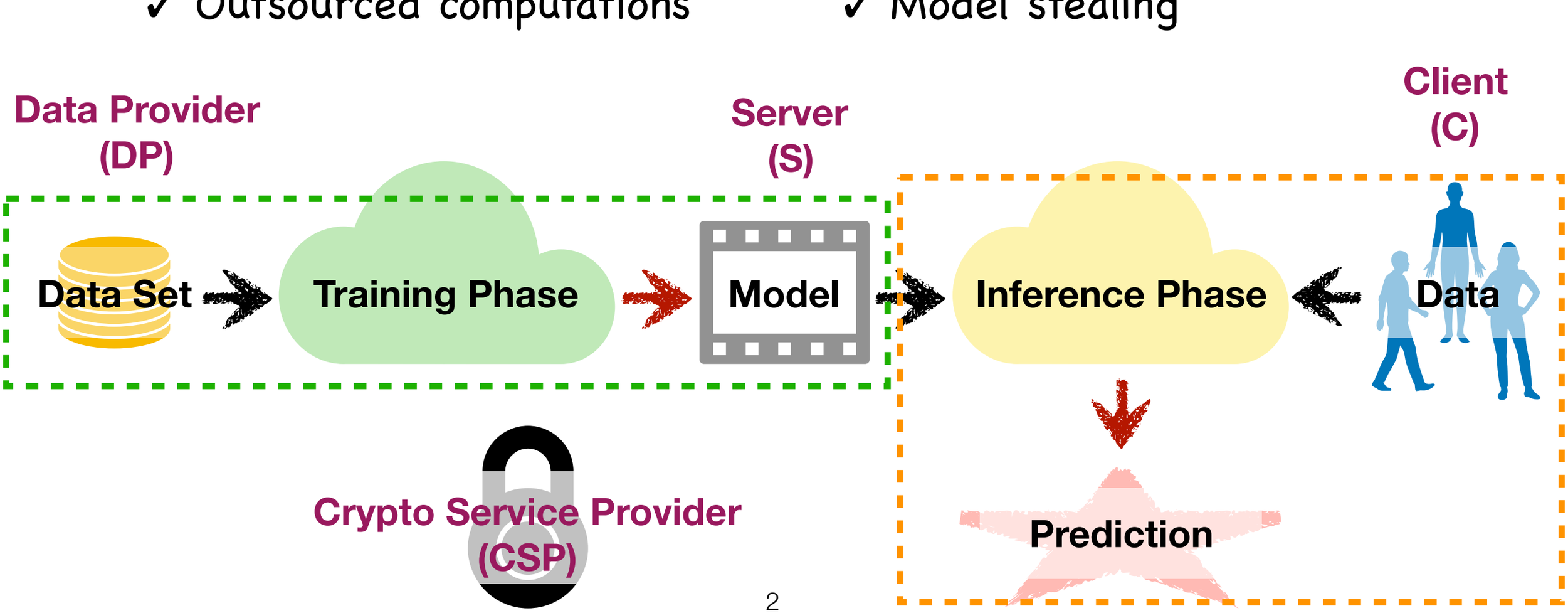
Security Issues in ML

- ✓ **Data Privacy**
  - ✓ Sensitive data
  - ✓ Outsourced computations
- ✓ **Model Security**
  - ✓ Intentional attacks
  - ✓ Model stealing



Secure-Preserving ML

- ✓ How to Enable Secure ML?
  - ✓ Fully Homomorphic Encryption (FHE)
  - ✓ The ultimate goal is to make the training phase as well as the inference phase secure with reducing the intermediate decryptions.
- ✓ What the problems are?
  - ✓ High computational cost
  - ✓ Evaluations of low-degree polynomials
- ✓ How to overcome the problems
  - ✓ Homomorphic encryption for arithmetic of approximate numbers (HEAAN)
  - ✓ Least-square support vector machine (LSSVM) with polynomial kernel