FABEO: Fast Attribute-based Encryption with Optimal Security

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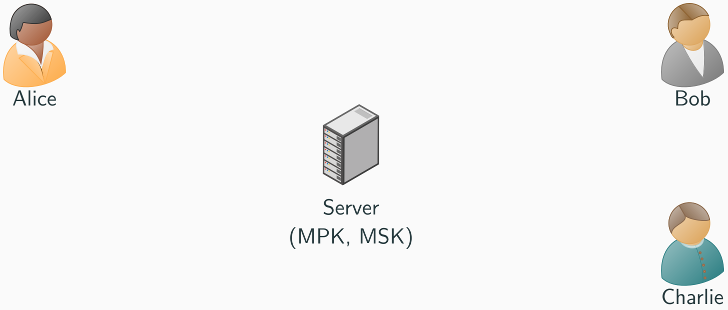

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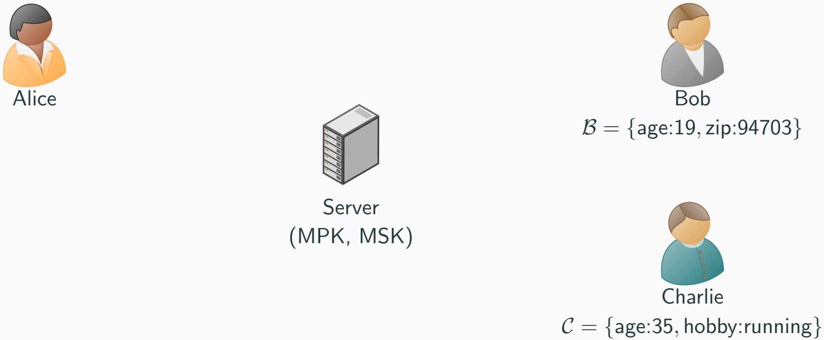

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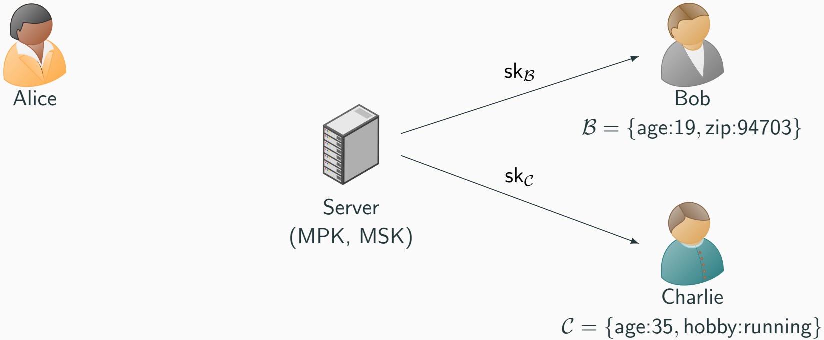

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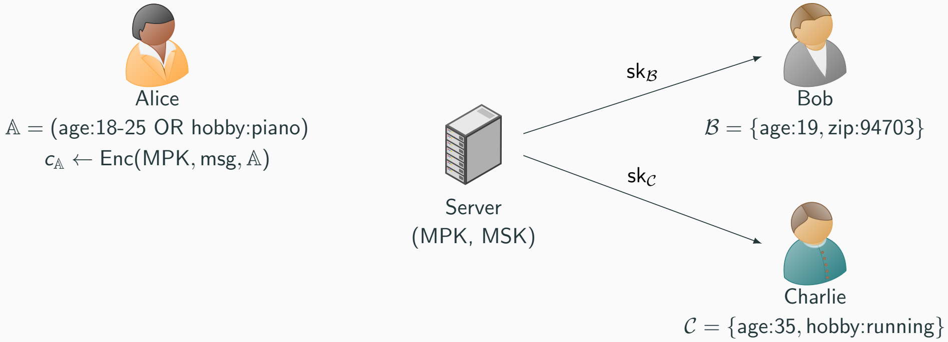

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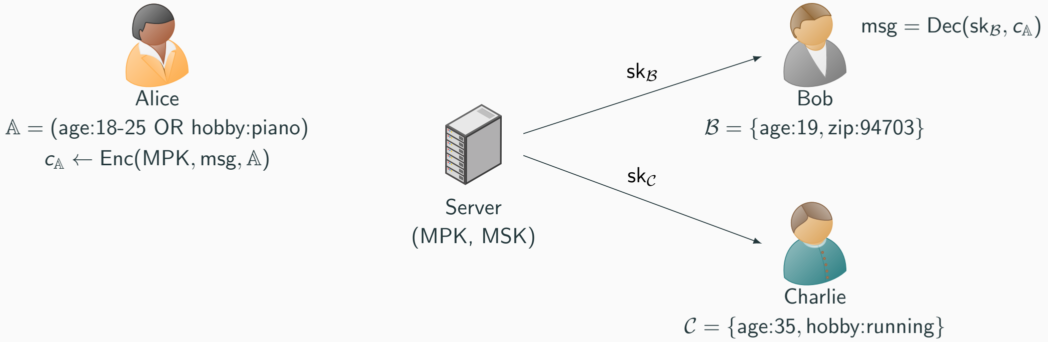

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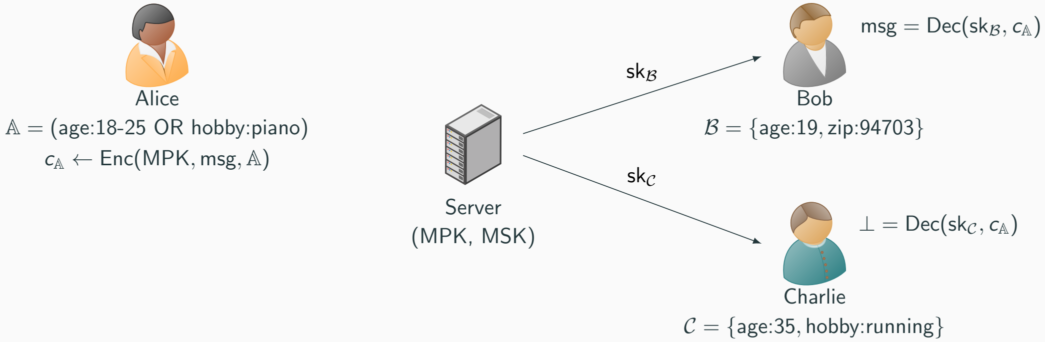

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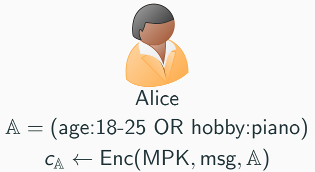

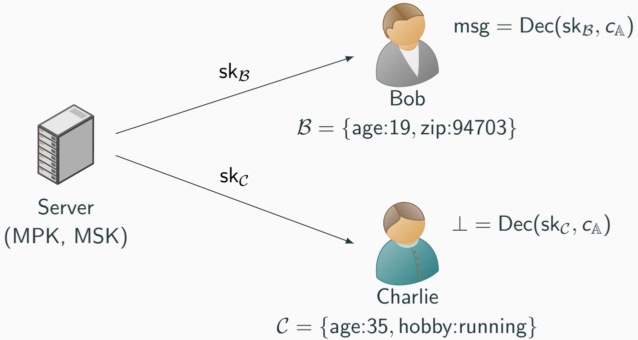

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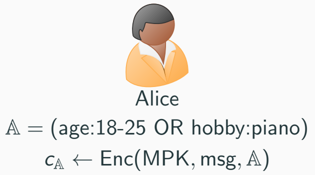

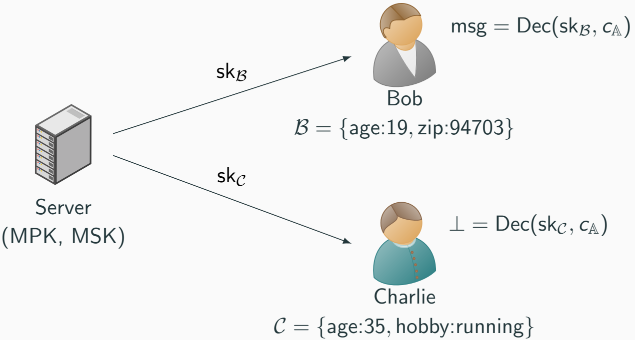

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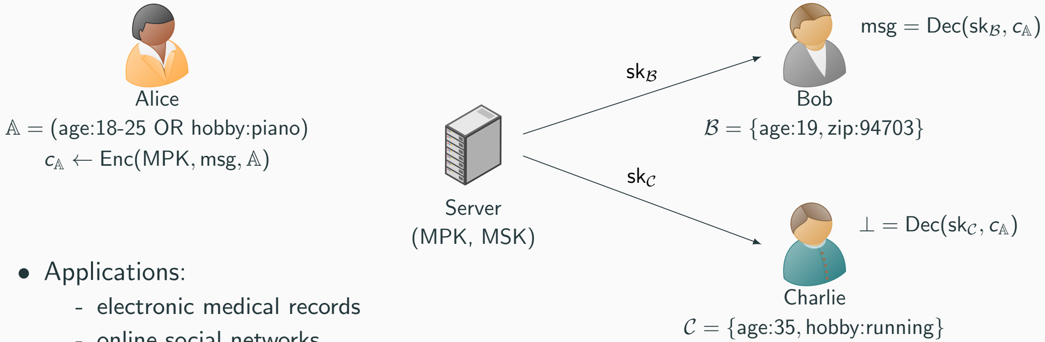

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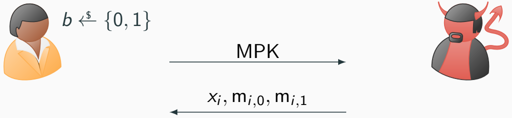

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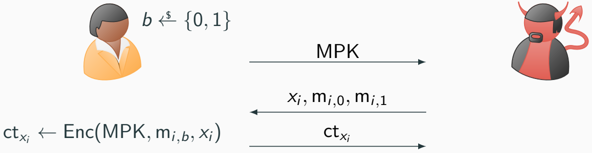

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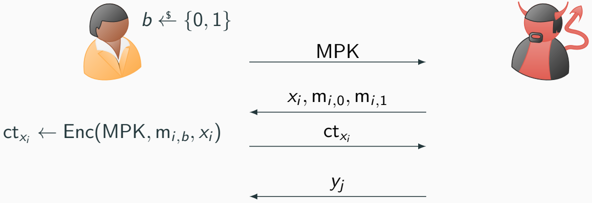

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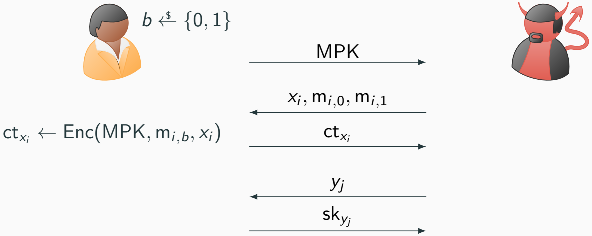

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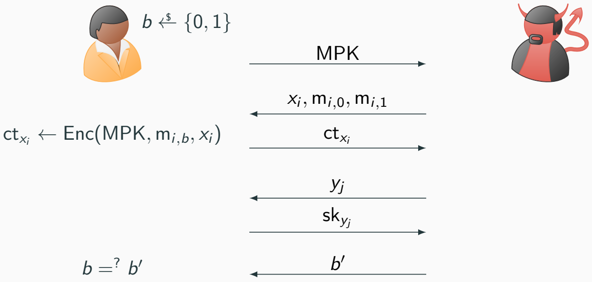

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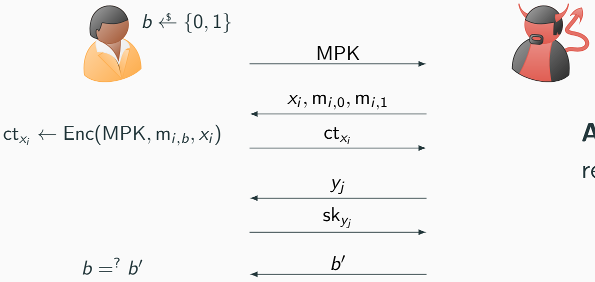

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$b \xleftarrow{\$} \{0,1\}$

MPK →

← $x_i, \mathsf{m}_{i,0}, \mathsf{m}_{i,1}$

$\mathsf{ct}_{x_i} \leftarrow \mathsf{Enc}(\mathsf{MPK}, \mathsf{m}_{i,b}, x_i)$ — ct_{x_i} →

← y_j

sk_{y_j} →

$b \stackrel{?}{=} b'$ — ← b'

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$\Rightarrow$ (many-ct, many-sk) security

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Asymmetric Bilinear Groups

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Generic Group Model (GGM)

- group operations via oracle access
- allows to prove lower bounds for generic adversaries
- much simpler and more efficient schemes

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Additional Properties

- no restrictions on size of policies or attribute sets
- arbitrary strings as attributes (e.g., street addresses)

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↓ $\mathsf{P}(x, y) = 1$ (correctness)

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$\not\downarrow$ $\mathsf{P}(x, y) \neq 1$ (symbolic security)

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Evaluation

CP-ABE Benchmark

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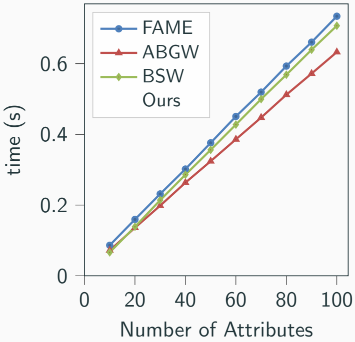

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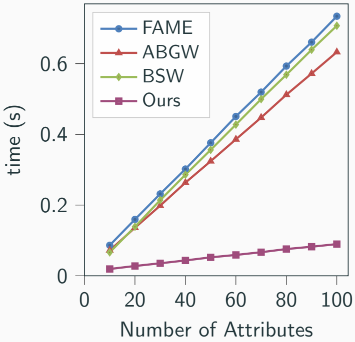

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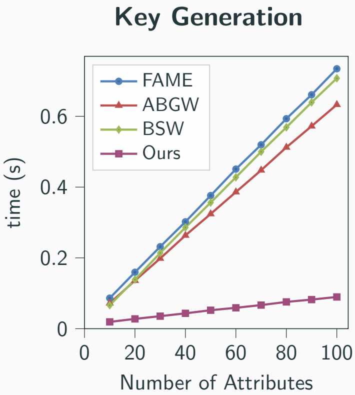

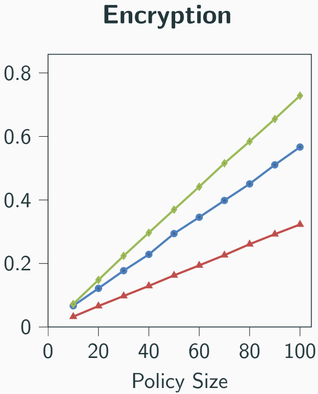

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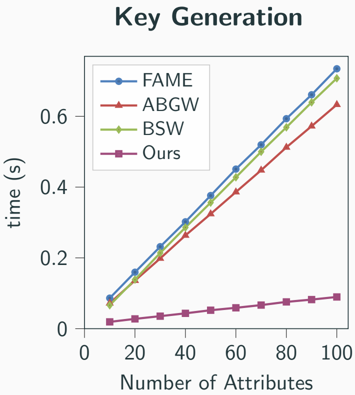

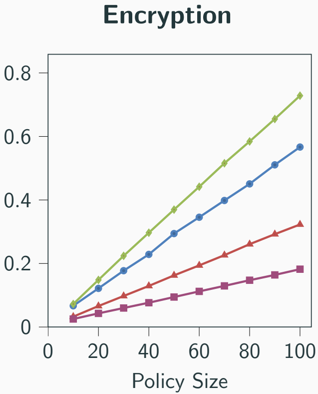

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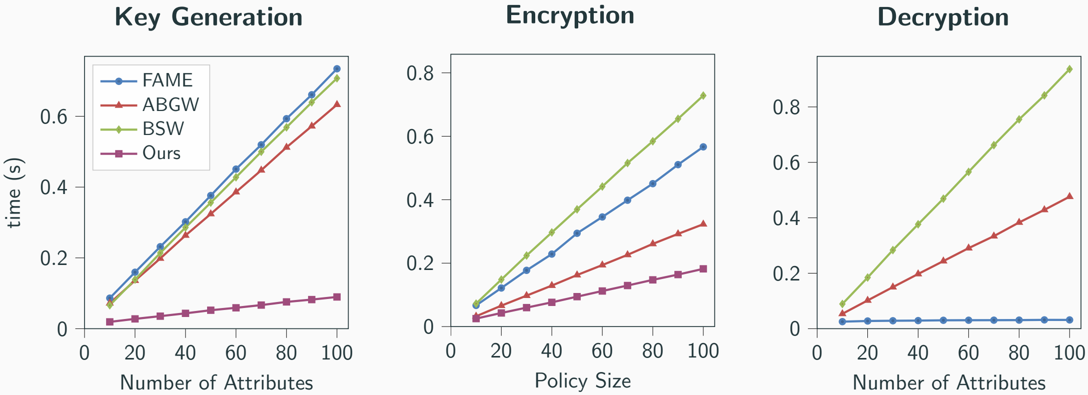

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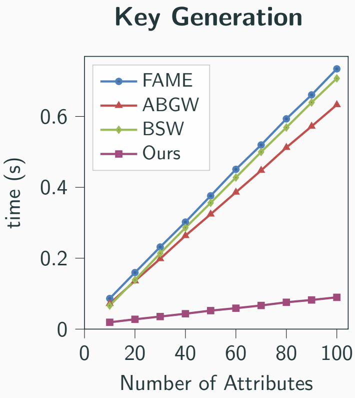

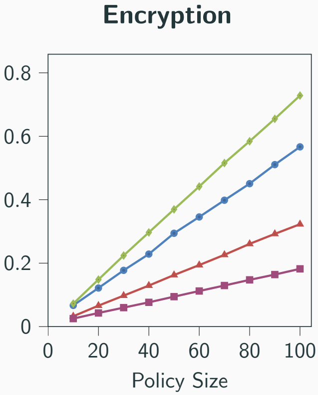

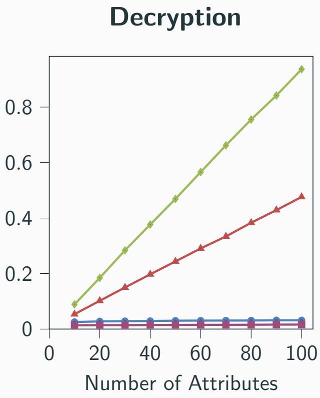

Conclusion

Summary

1. New definition for PES-ABE and symbolic security
2. Optimal tightness in the GGM achieving (many-ct, many-sk)-security
3. Smaller ciphertext/key sizes and better efficiency

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Thank you!