Industrial Placement Presentation

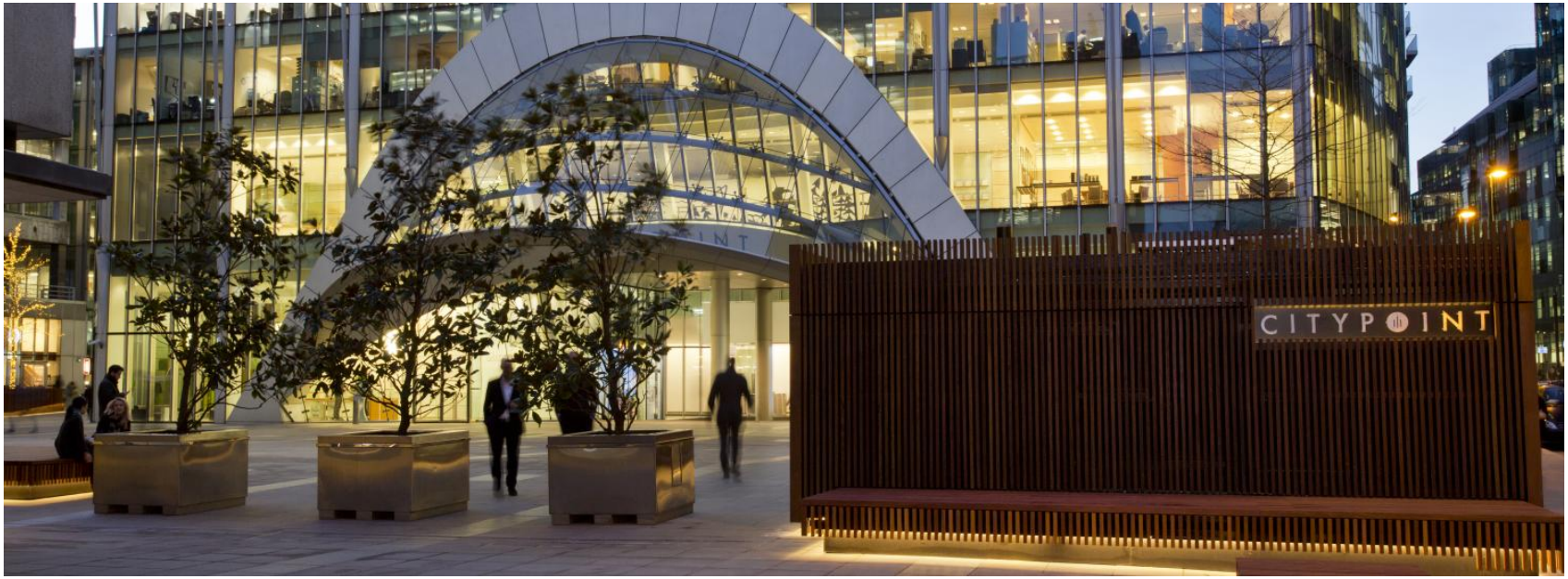
David Kurniadi Angdinata

MEng Mathematics and Computer Science 4

Friday, 04 October 2019

Company profile

Company profile



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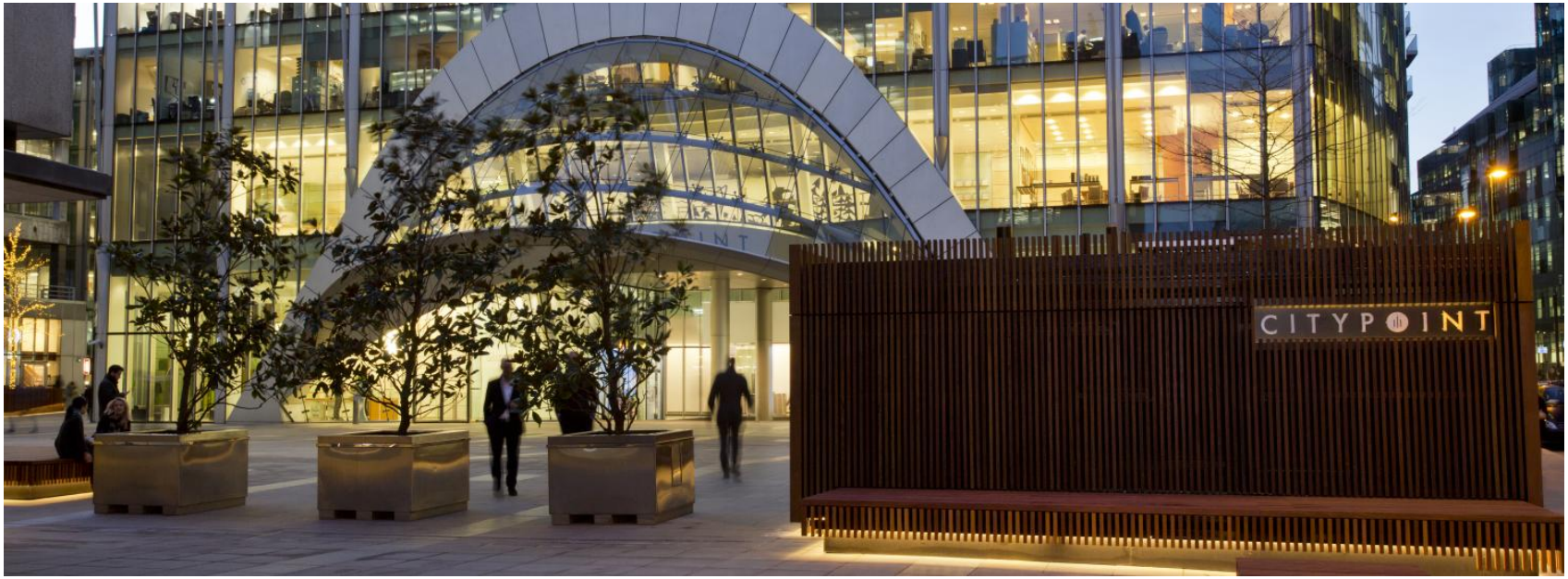

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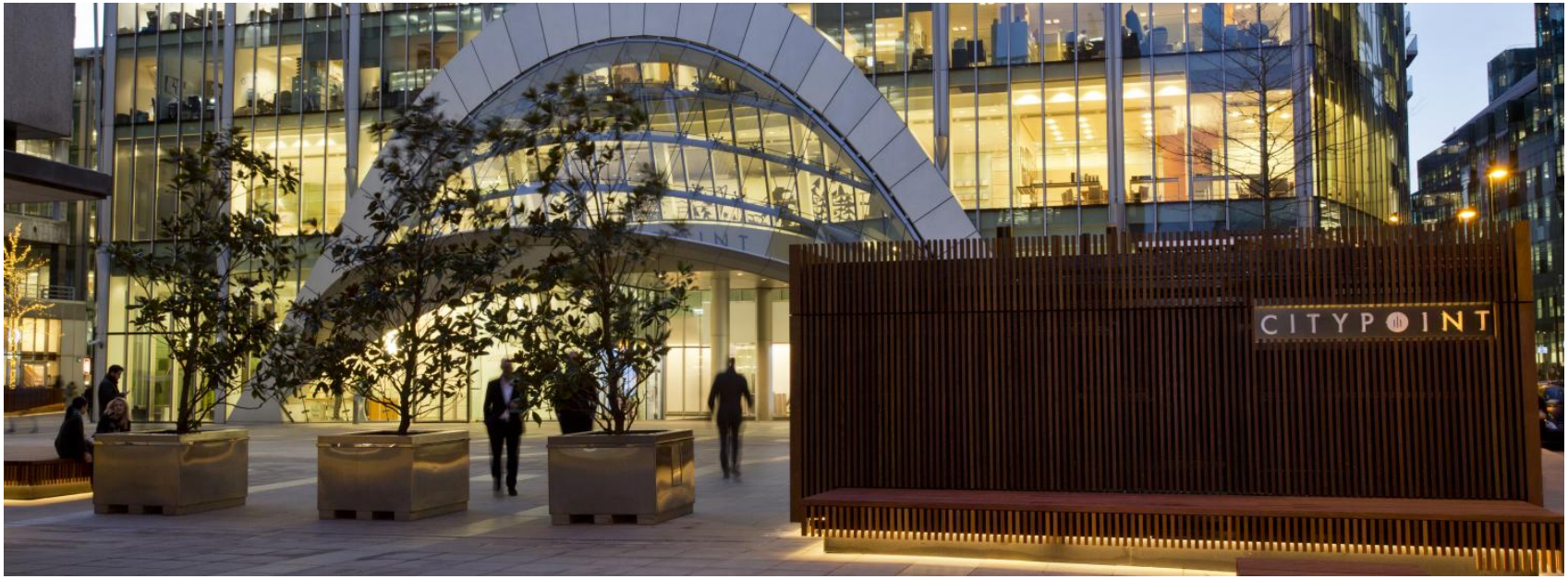

Company profile

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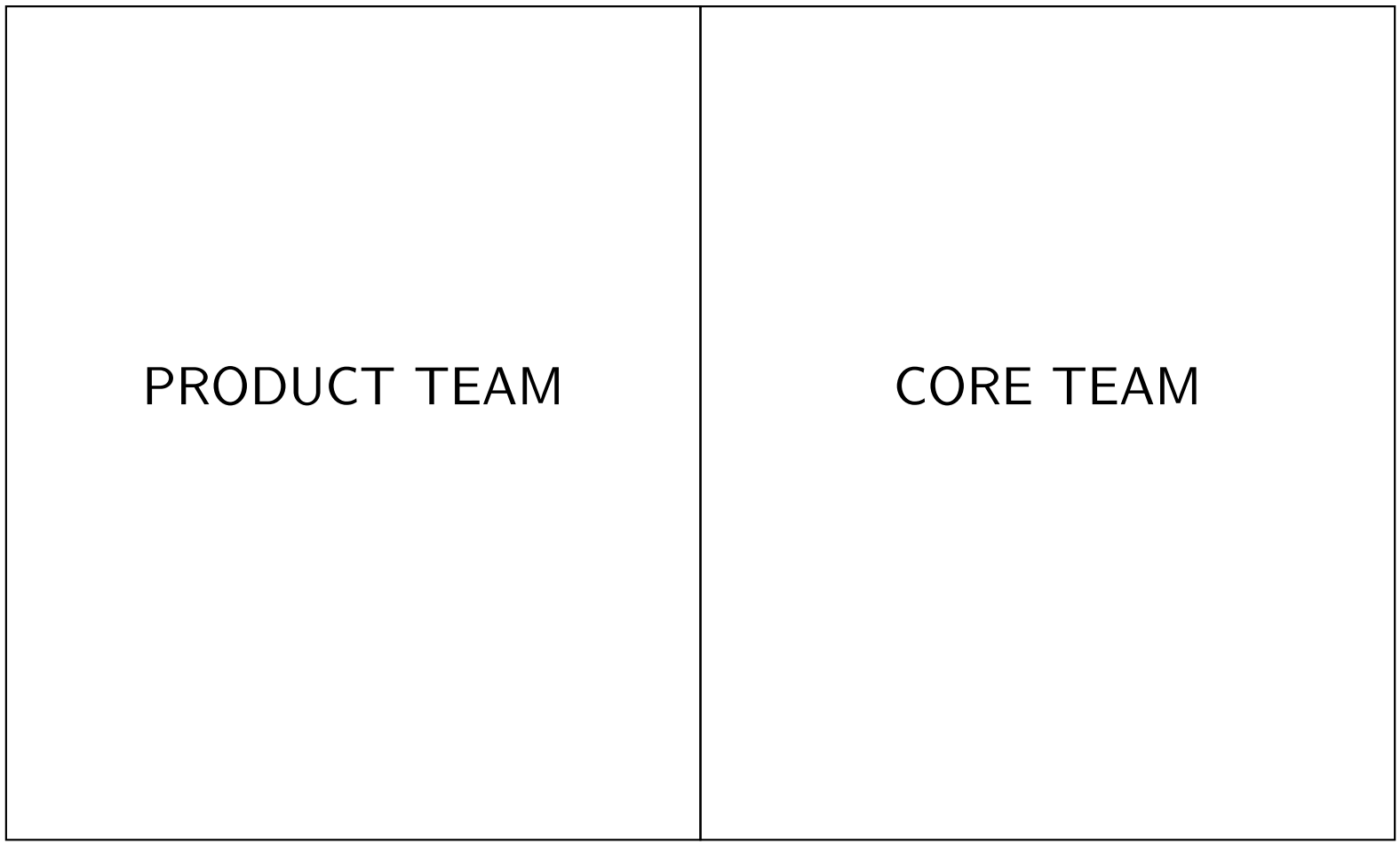
Adjoint delivers enterprise applications for both finance professionals and technical adminstrators. We continually push the envelope to achieve excellence in security and privacy. Our technology is designed to support your ever-changing business needs.

Organisation roles

Organisation roles

Organisation roles



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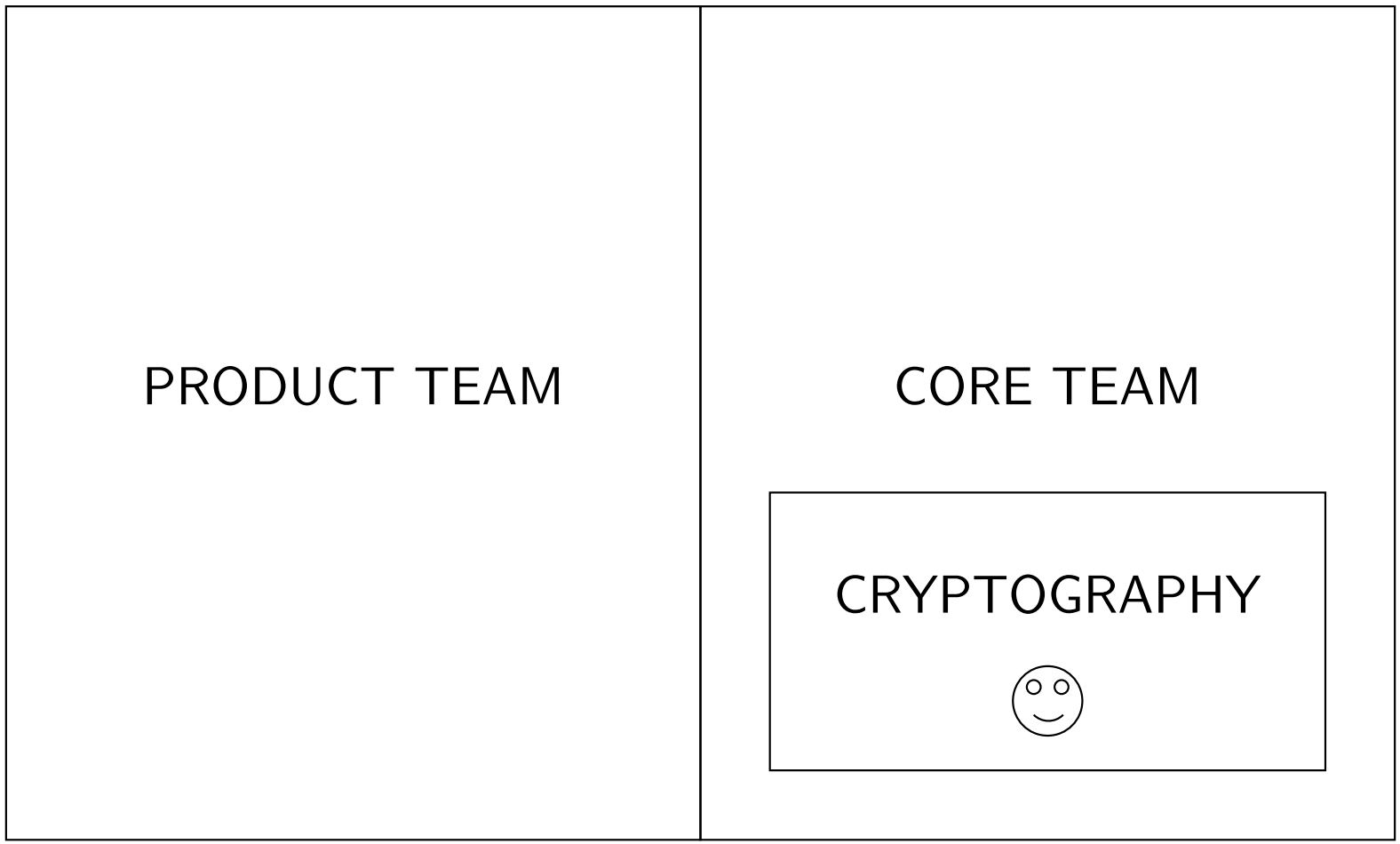

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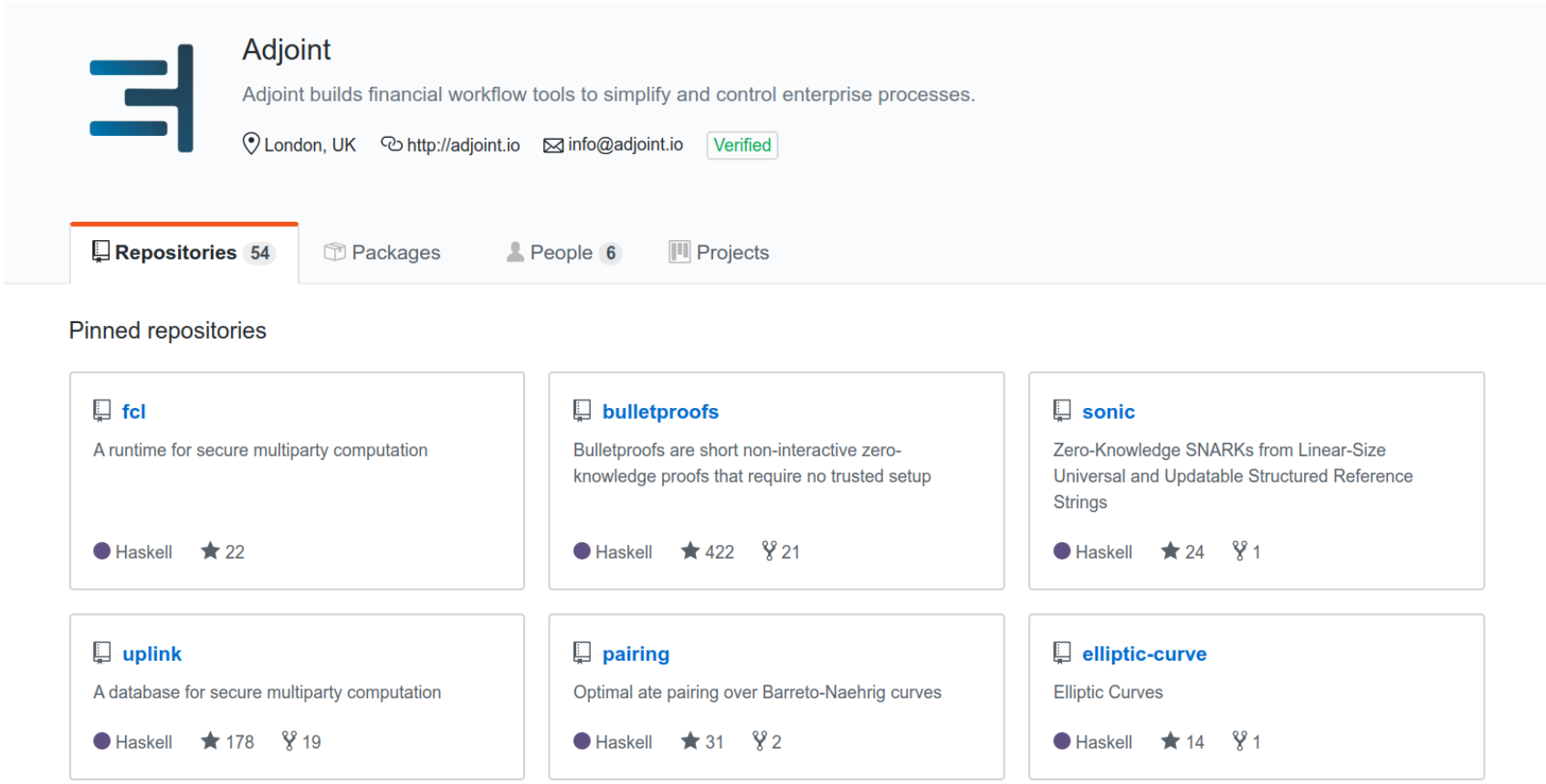

Adjoint

Adjoint builds financial workflow tools to simplify and control enterprise processes.

London, UK http://adjoint.io info@adjoint.io Verified

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Pinned repositories

fcl
A runtime for secure multiparty computation
Haskell ★ 22

bulletproofs
Bulletproofs are short non-interactive zero-knowledge proofs that require no trusted setup
Haskell ★ 422 21

sonic
Zero-Knowledge SNARKs from Linear-Size Universal and Updatable Structured Reference Strings
Haskell ★ 24 1

uplink
A database for secure multiparty computation
Haskell ★ 178 19

pairing
Optimal ate pairing over Barreto-Naehrig curves
Haskell ★ 31 2

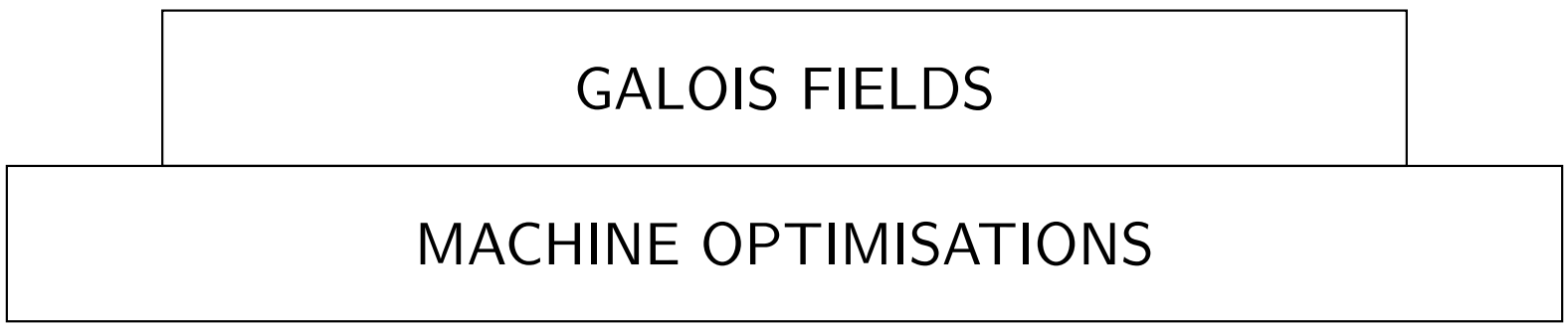
elliptic-curve
Elliptic Curves
Haskell ★ 14 1

Cryptography roadmap

Cryptography roadmap

MACHINE OPTIMISATIONS

Cryptography roadmap



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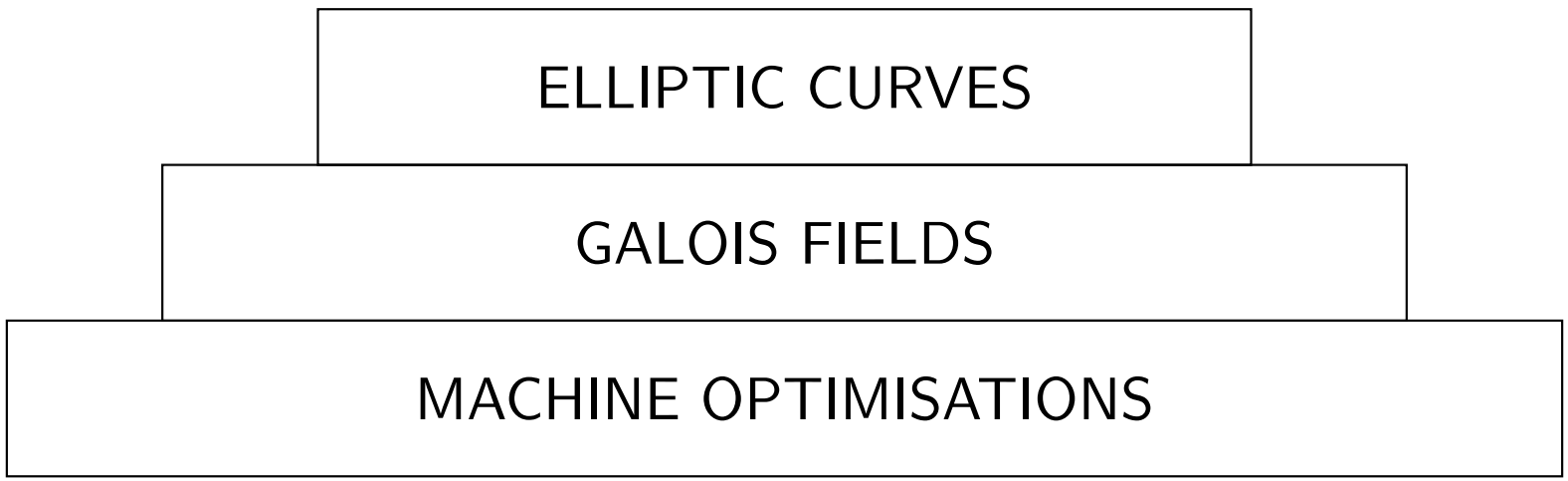

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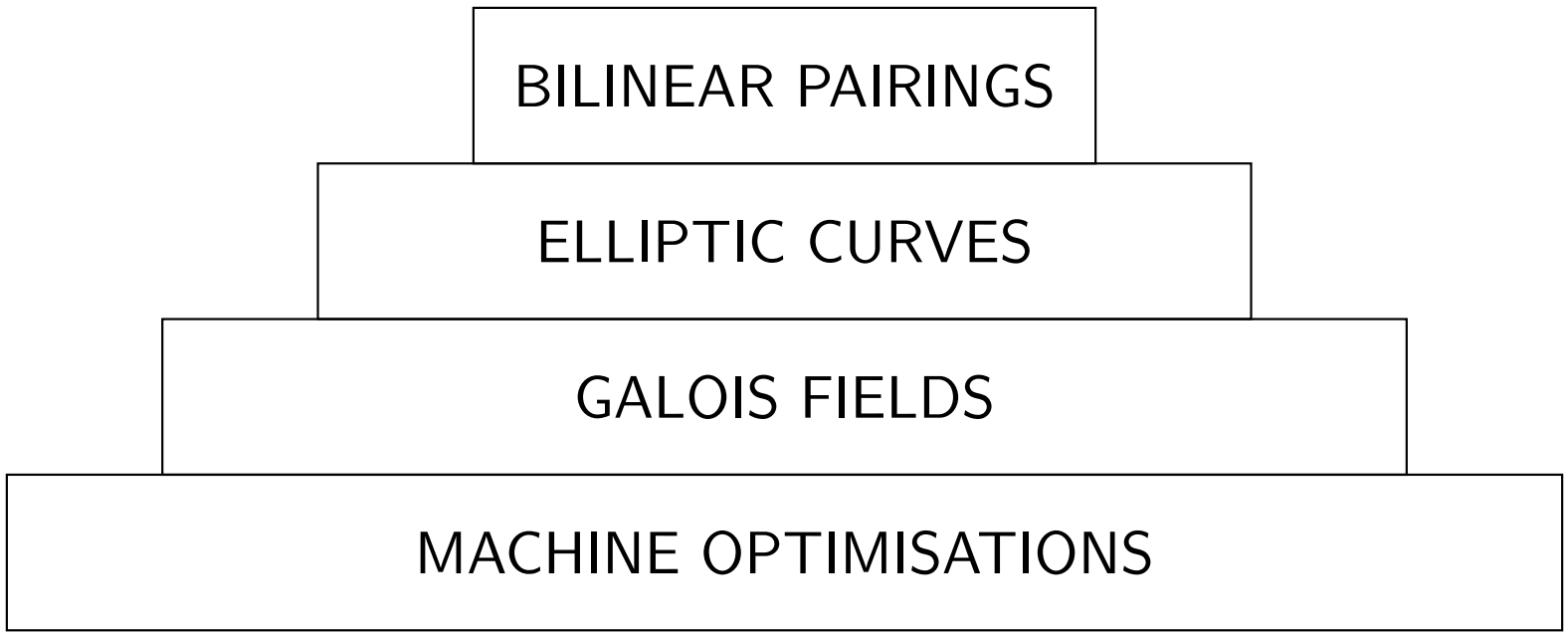

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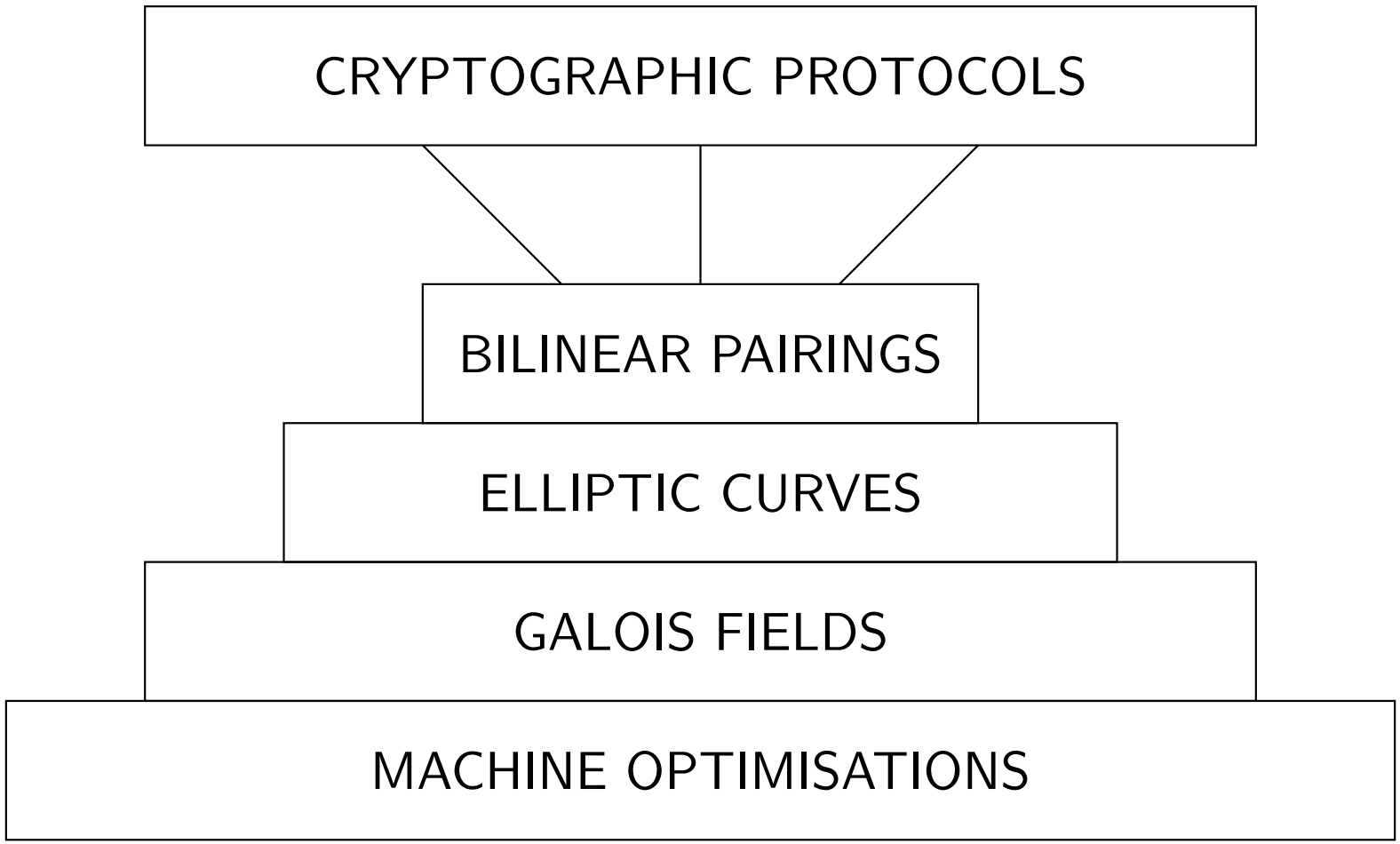

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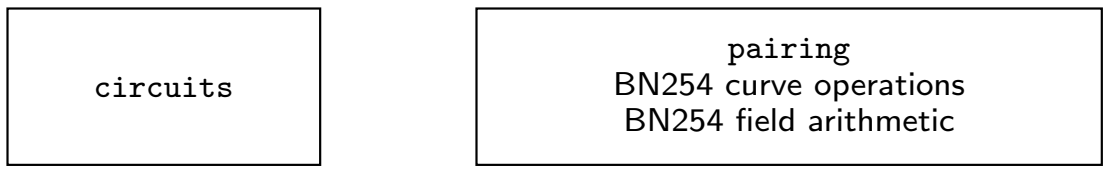

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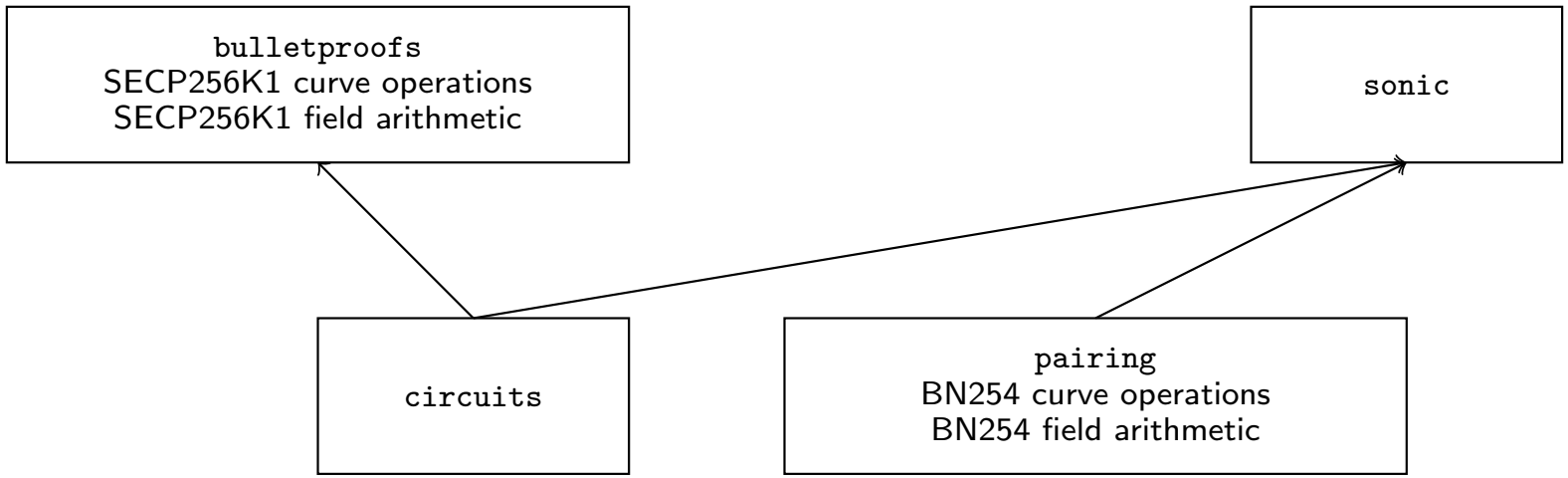

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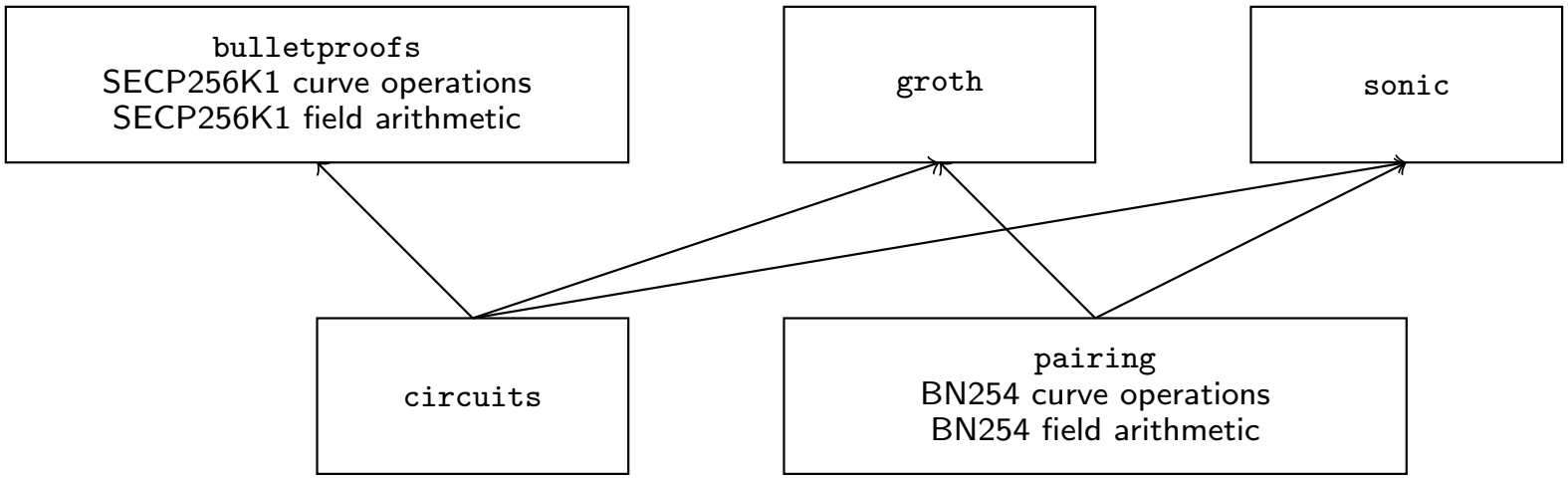

An efficient library of Galois fields

An efficient library of Galois fields

galois-field: Galois field library

[cryptography, library, mit] [Propose Tags]

An efficient implementation of Galois fields used in cryptography research

[Skip to Readme]

Modules

[Index] [Quick Jump]

Data

Field

Data.Field.Galois

Versions [faq]

0.1.0, 0.2.0, 0.2.1, 0.3.0, 0.4.0, 0.4.1, **1.0.0**

Change log

ChangeLog.md

Dependencies

base (>=4.10 && <5), groups, integer-gmp, MonadRandom, poly (>=0.3.2), protolude (==0.2.*), semirings (>=0.5), tasty-quickcheck, vector, wl-pprint-text [details]

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- Prime fields and extension fields

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- Extensive usage of type system

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- Extensive usage of type system
- Slow performance of binary fields

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- Square roots and scalar multiplication

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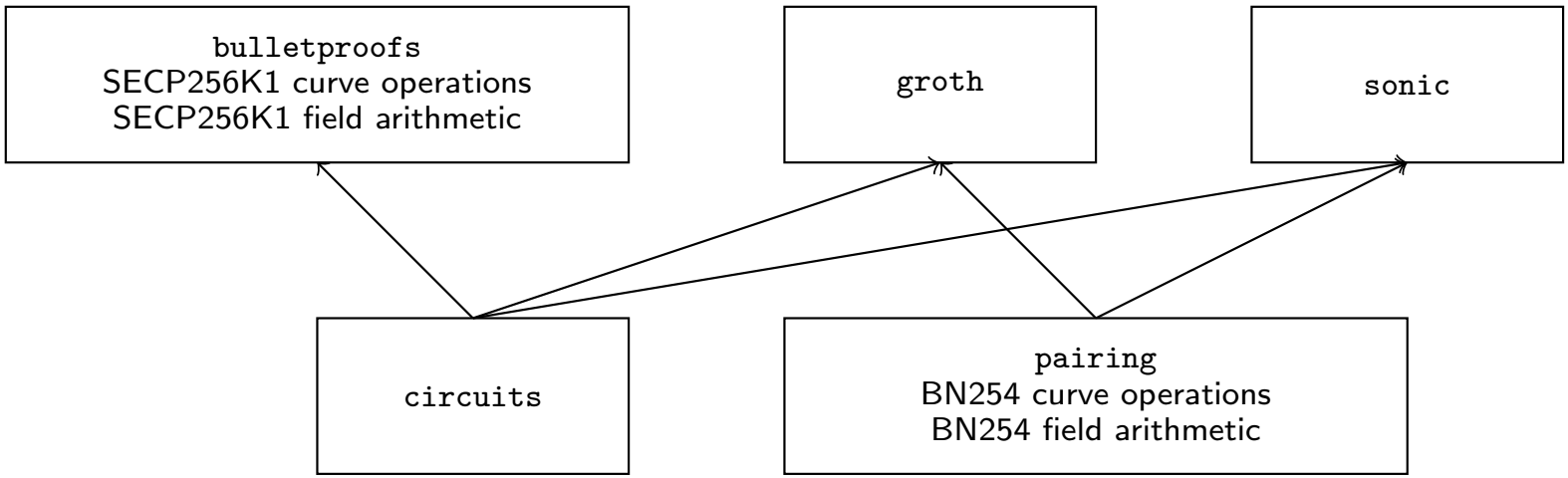
- Prime fields and extension fields
- Extensive usage of type system
- Slow performance of binary fields
- Square roots and scalar multiplication
- Heavy compile-time and run-time optimisations

An efficient library of Galois fields



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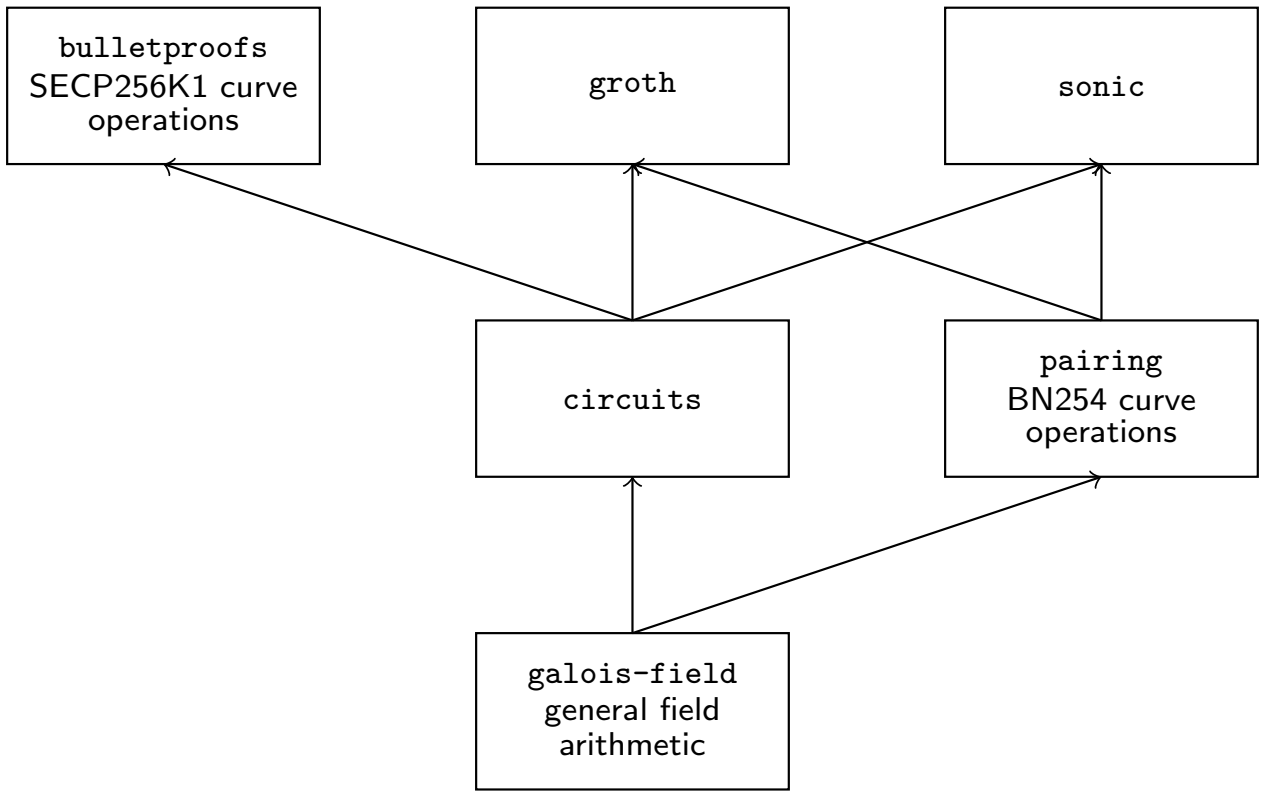

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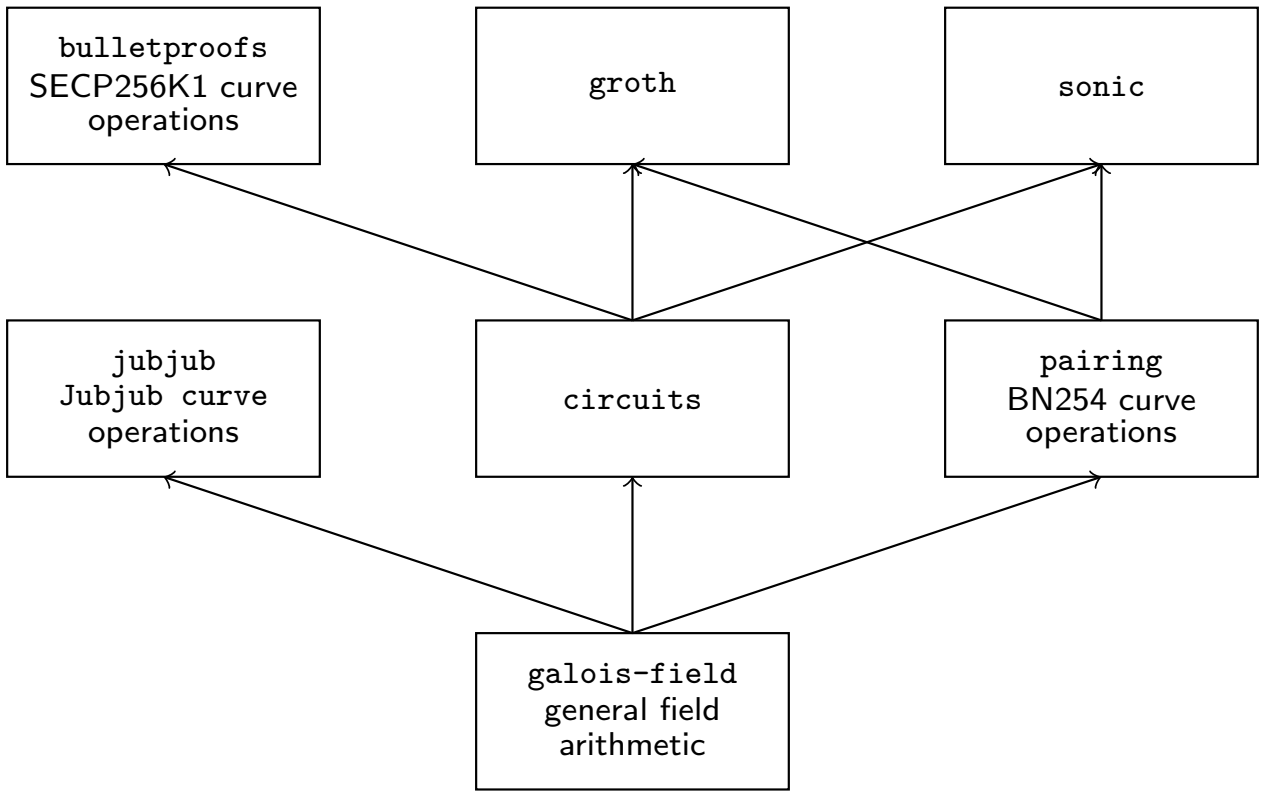

A universal library of elliptic curves

A universal library of elliptic curves

elliptic-curve: Elliptic curve library

[cryptography, library, mit] [Propose Tags]

An extensible library of elliptic curves used in cryptography research

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Modules

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Data

- Data.Curve
  - Data.Curve.Binary
    - Data.Curve.Binary.SECT113R1
    - Data.Curve.Binary.SECT113R2
    - Data.Curve.Binary.SECT131R1
    - Data.Curve.Binary.SECT131R2
    - Data.Curve.Binary.SECT163K1
    - Data.Curve.Binary.SECT163R1

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Author

Maintainer
Adjoint Inc (info@adjoint.io)

Category
Cryptography

A universal library of elliptic curves

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Category
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- Eighty elliptic curve domain parameters

A universal library of elliptic curves

elliptic-curve: Elliptic curve library

[cryptography, library, mit] [Propose Tags]

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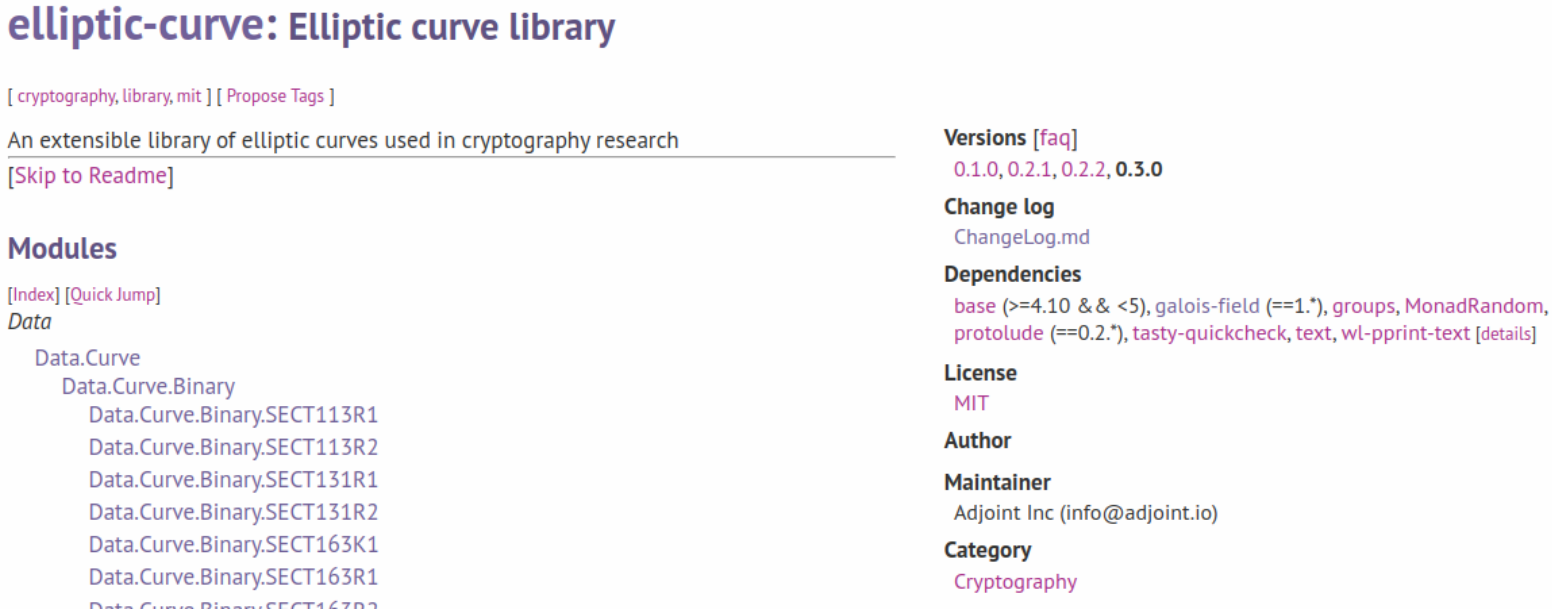
Category
Cryptography

- Eighty elliptic curve domain parameters
- Elliptic curve multi-parameter type class

A universal library of elliptic curves



elliptic-curve: Elliptic curve library

[cryptography, library, mit] [Propose Tags]

An extensible library of elliptic curves used in cryptography research

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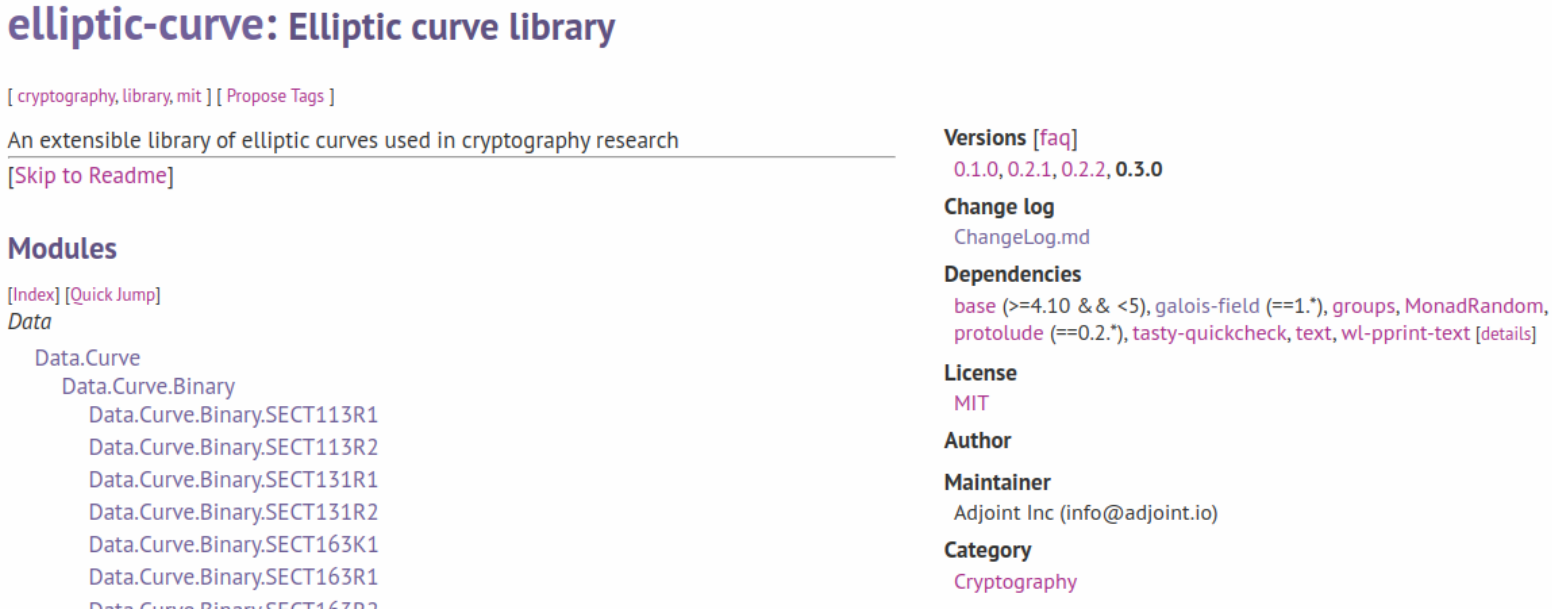
A universal library of elliptic curves



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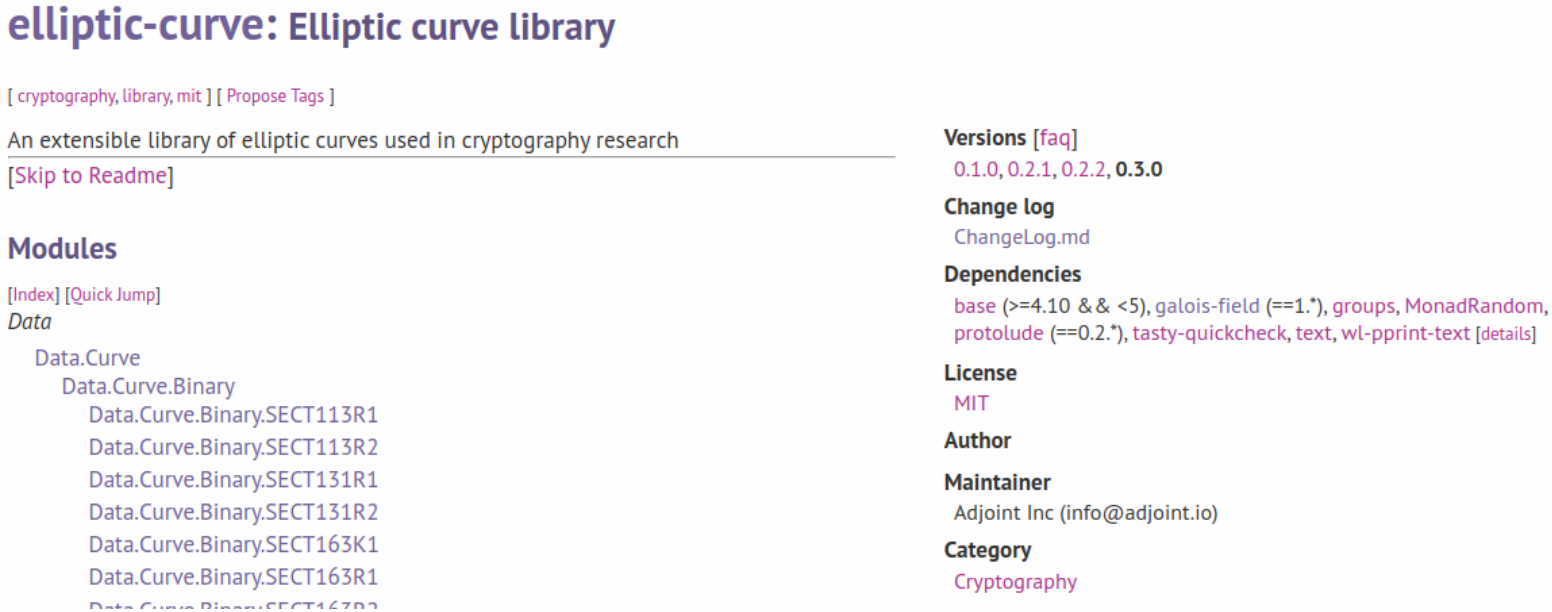

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ChangeLog.md

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- Elliptic curve point associated type
- Elliptic curve point addition formulas
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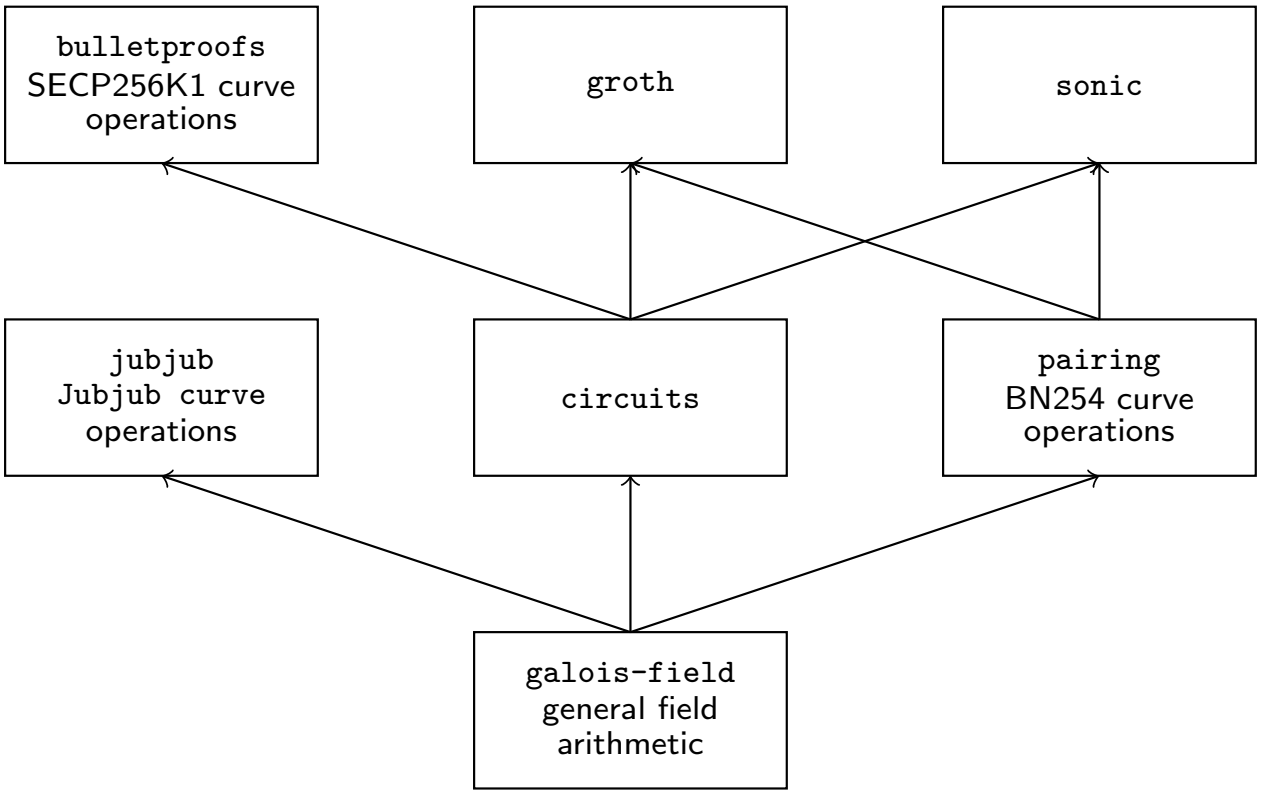

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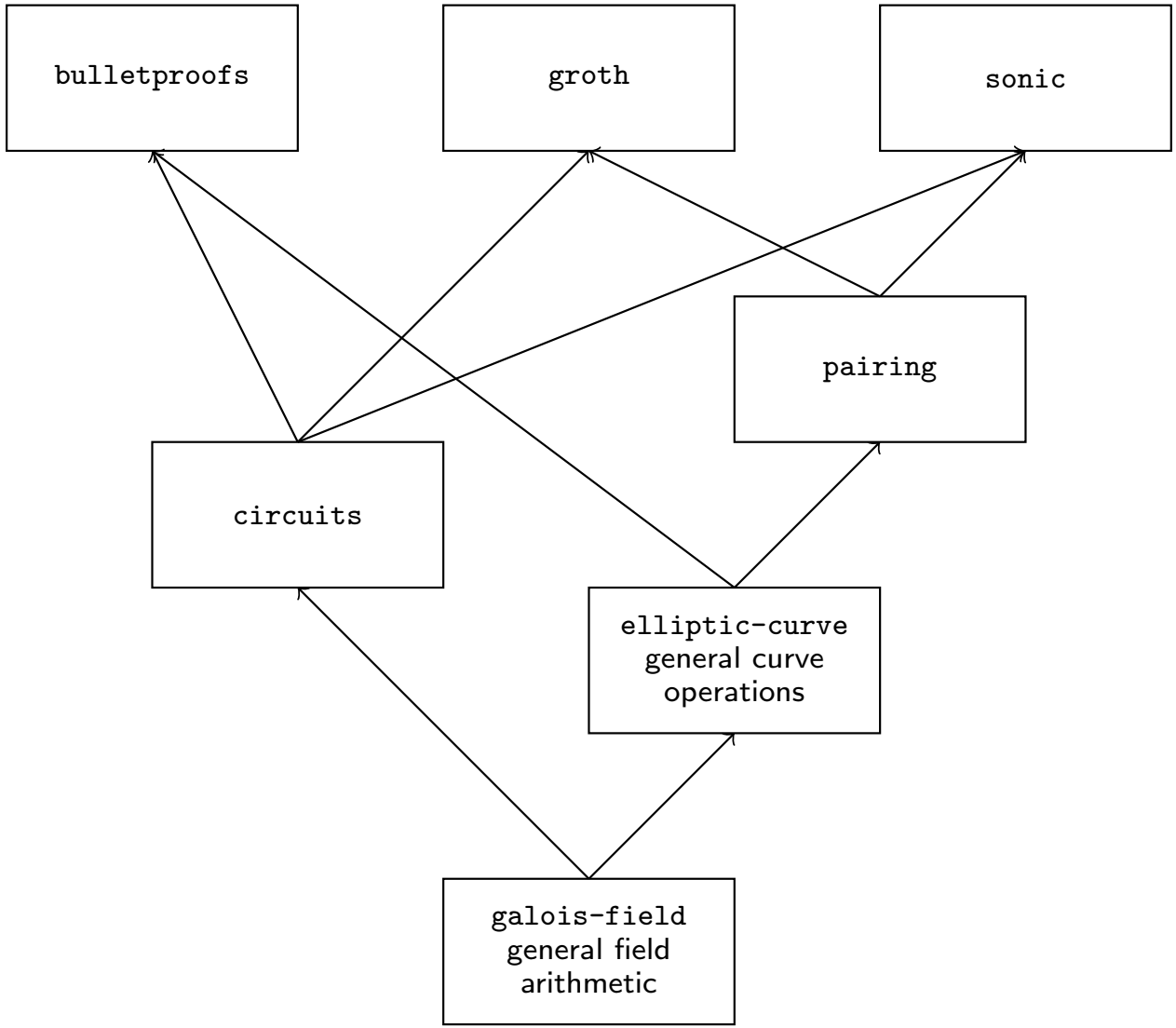

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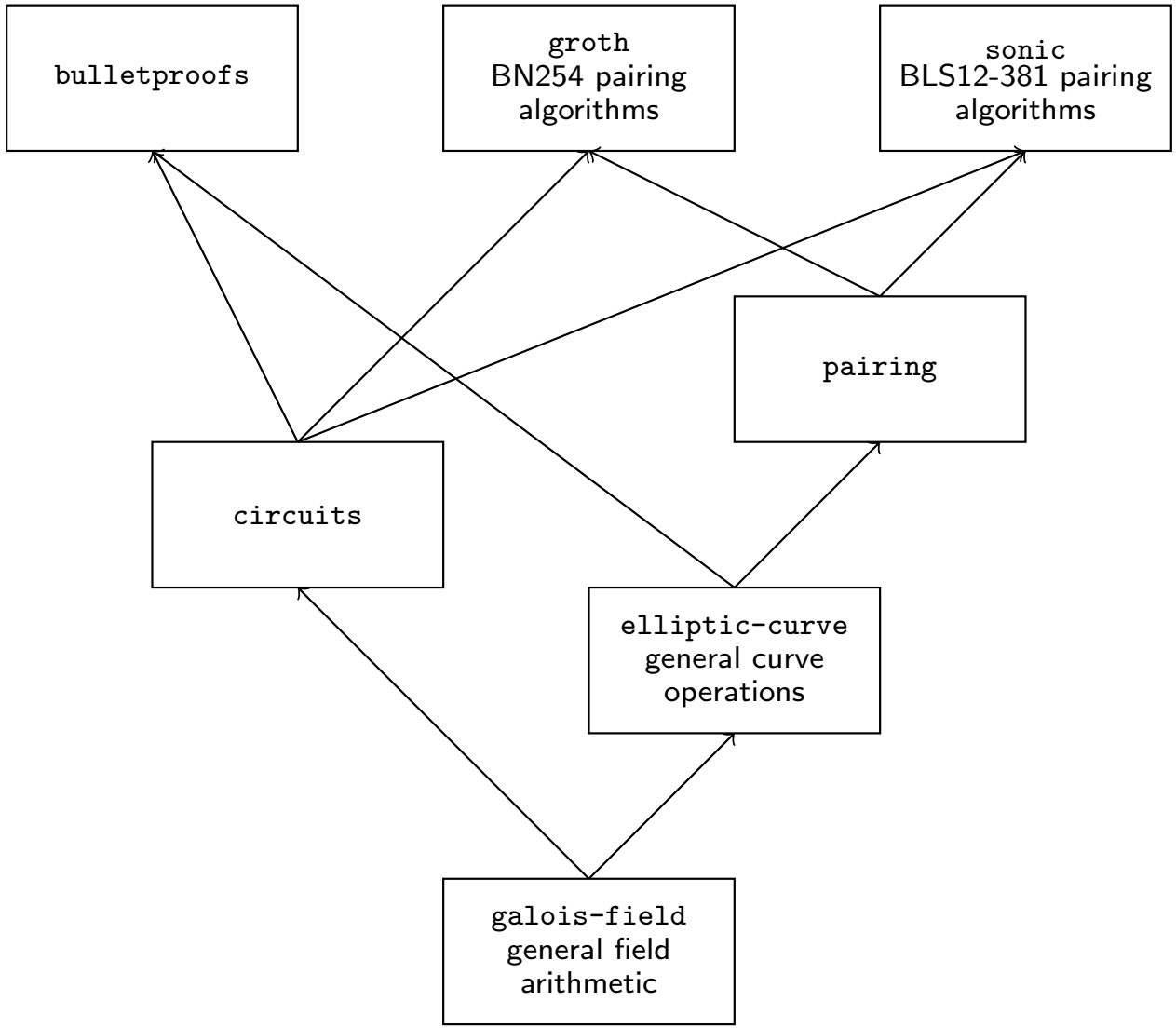

A polymorphic library of bilinear pairings

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pairing: Bilinear pairings

[cryptography, library, mit] [Propose Tags]

Optimal Ate pairing over Barreto-Naehrig curves

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Modules

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Data

- Data.Pairing
  - Data.Pairing.Ate
  - Data.Pairing.BLS12381
  - Data.Pairing.BN254

Versions [faq]

0.1.0, 0.1.1, 0.1.2, 0.1.3, 0.1.4, 0.2, 0.3.0, 0.3.1, 0.4.1, 0.4.2, 0.5.0, **1.0.0**

Change log

ChangeLog.md

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base (>=4.10 && <5), bytestring, elliptic-curve (==0.3.*), errors, galois-field (==1.*), groups, MonadRandom, protolude (==0.2.*), tasty-quickcheck [details]

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- Pairing for BN and BLS

A polymorphic library of bilinear pairings

pairing: Bilinear pairings

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- General bilinear pairing type class

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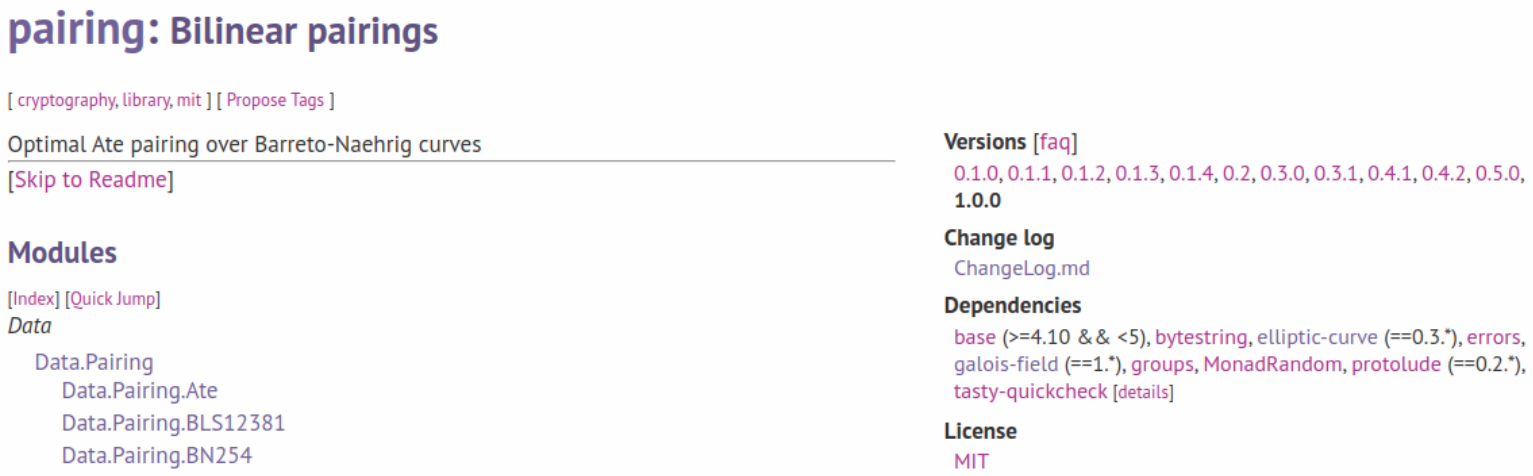
- General optimal ate pairing algorithm

A polymorphic library of bilinear pairings



pairing: Bilinear pairings

[cryptography, library, mit] [Propose Tags]

Optimal Ate pairing over Barreto-Naehrig curves

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Modules

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Data

Data.Pairing
Data.Pairing.Ate
Data.Pairing.BLS12381
Data.Pairing.BN254

Versions [faq]

0.1.0, 0.1.1, 0.1.2, 0.1.3, 0.1.4, 0.2, 0.3.0, 0.3.1, 0.4.1, 0.4.2, 0.5.0, **1.0.0**

Change log

ChangeLog.md

Dependencies

base (>=4.10 && <5), bytestring, elliptic-curve (==0.3.*), errors, galois-field (==1.*), groups, MonadRandom, protolude (==0.2.*), tasty-quickcheck [details]

License

MIT

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- Seven elliptic curve bilinear pairings

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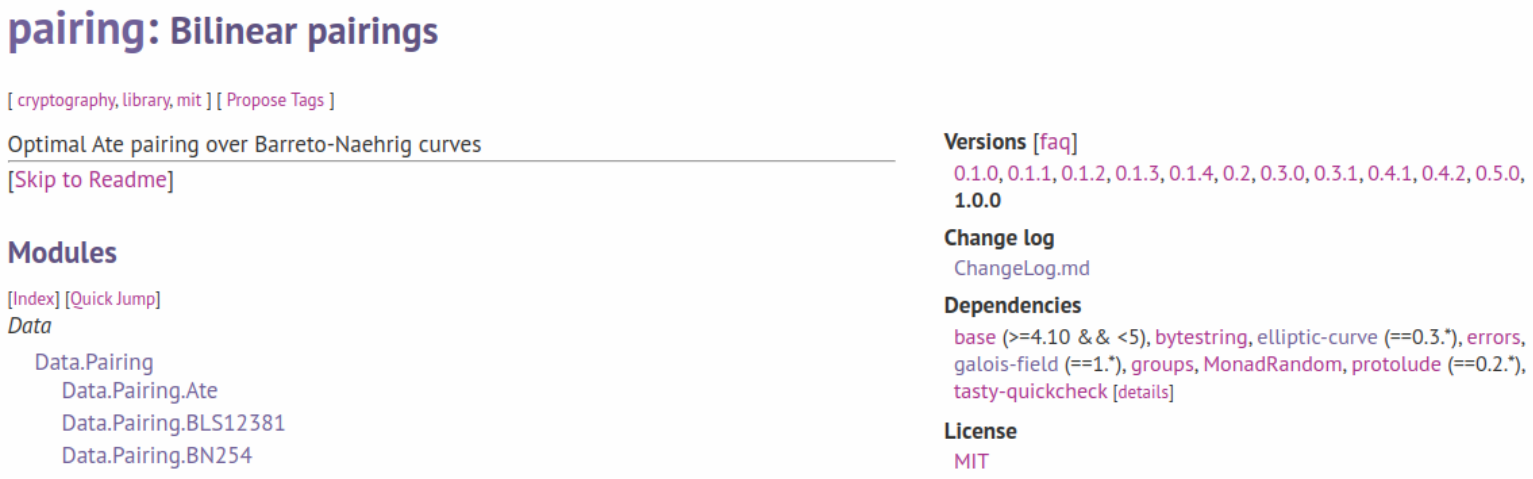

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- BN elliptic curve hashing function

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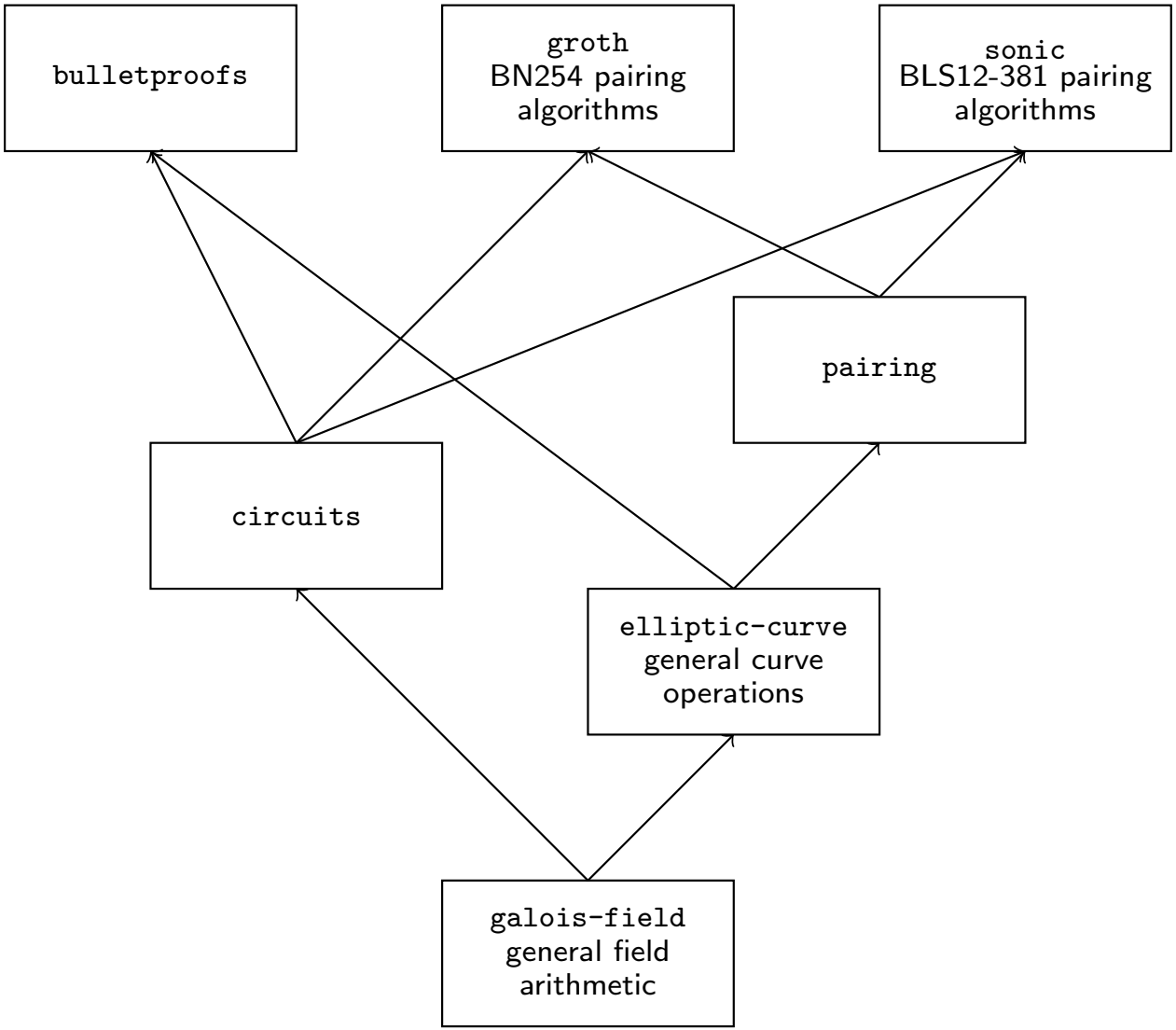

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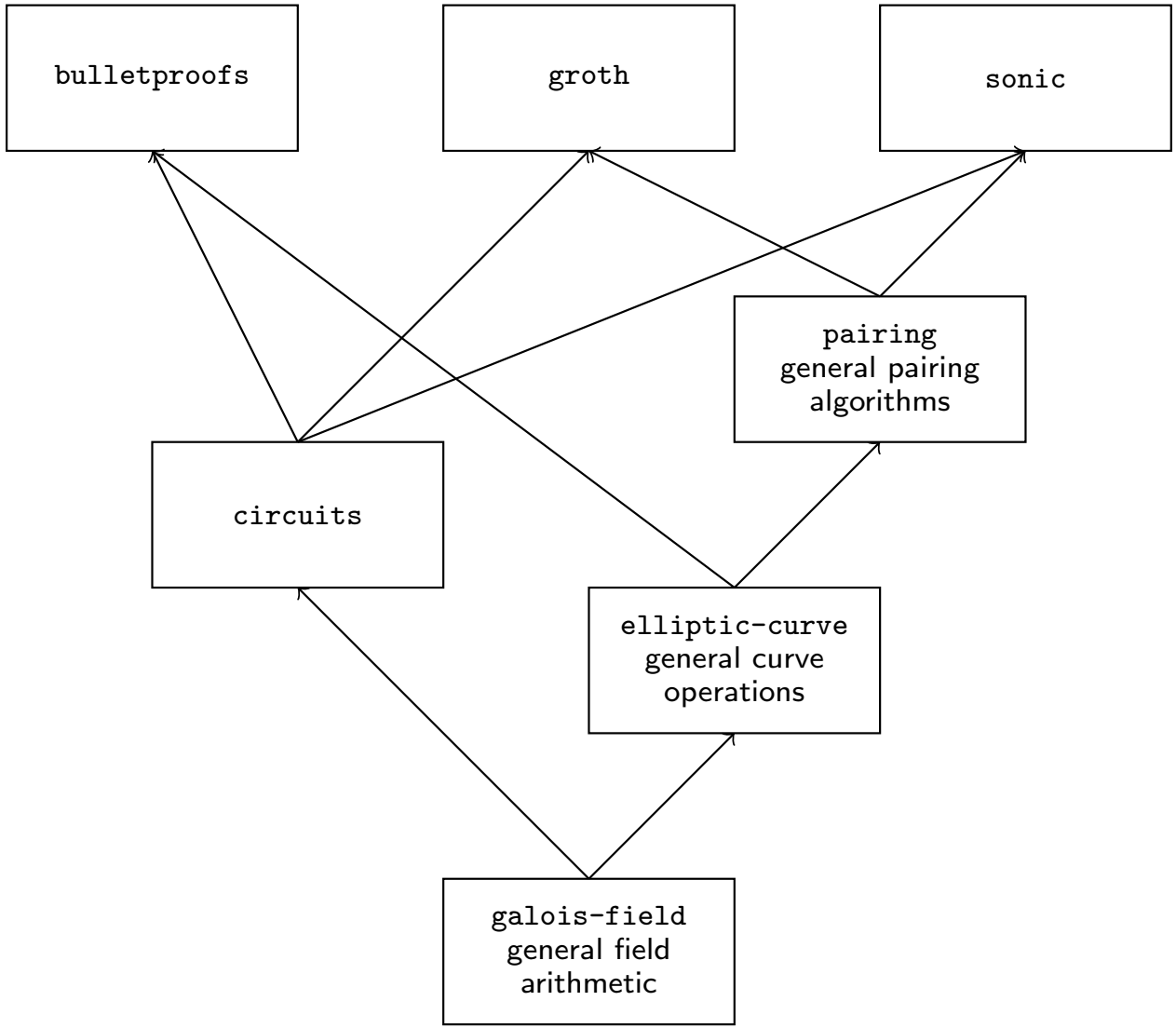

Conclusion

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Powerful type system in Haskell

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Crucial performance optimisations in Haskell

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Mathematical background behind zero-knowledge proofs

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THANK YOU