Formally Proving and Enhancing a Self-Stabilising Distributed Algorithm

PNSE

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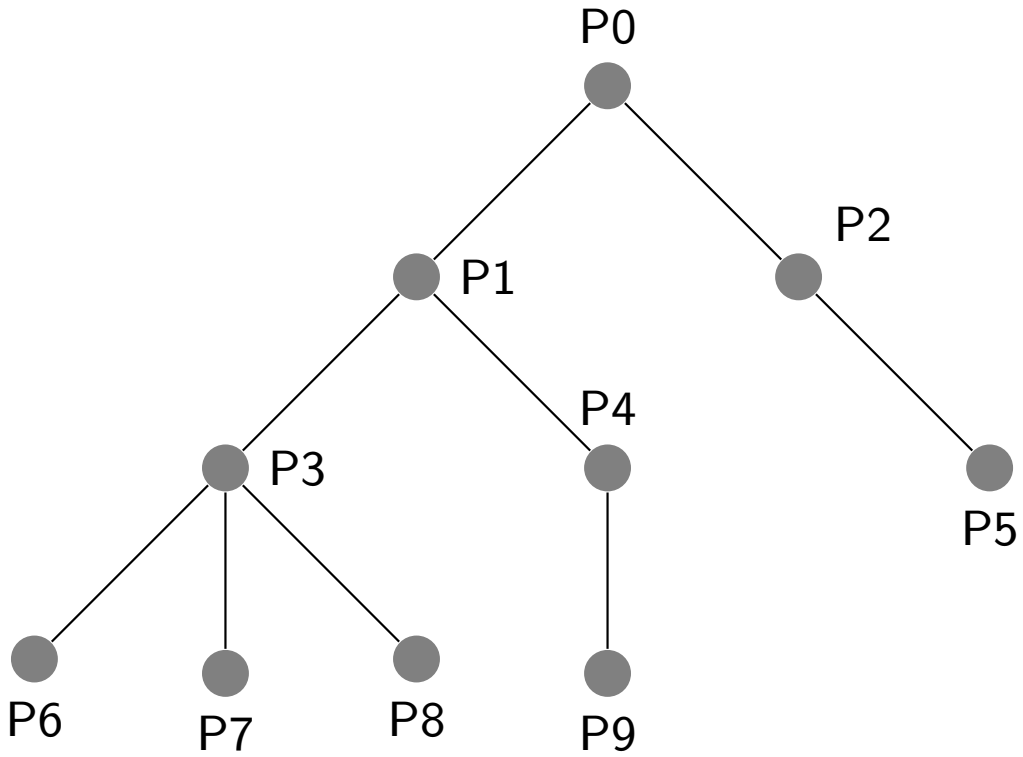
Roadmap

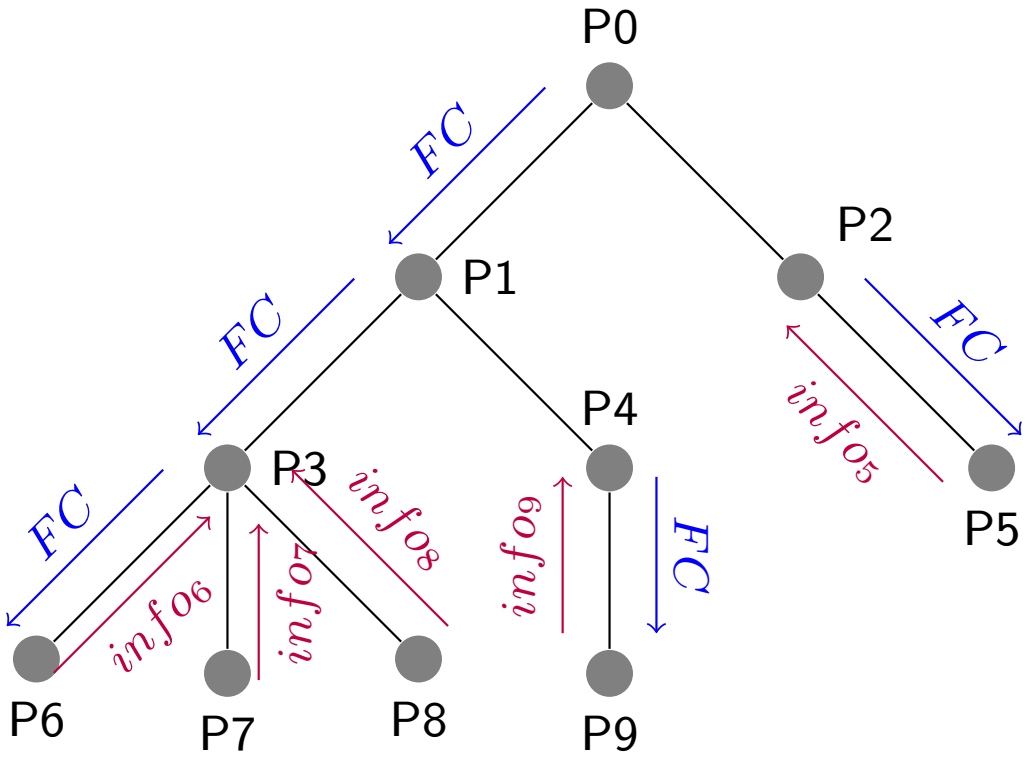
Introduction

Which algorithm, why it is useful self-stabilisation / lengthy cumbersome proofs $\rightarrow$ formal modelling

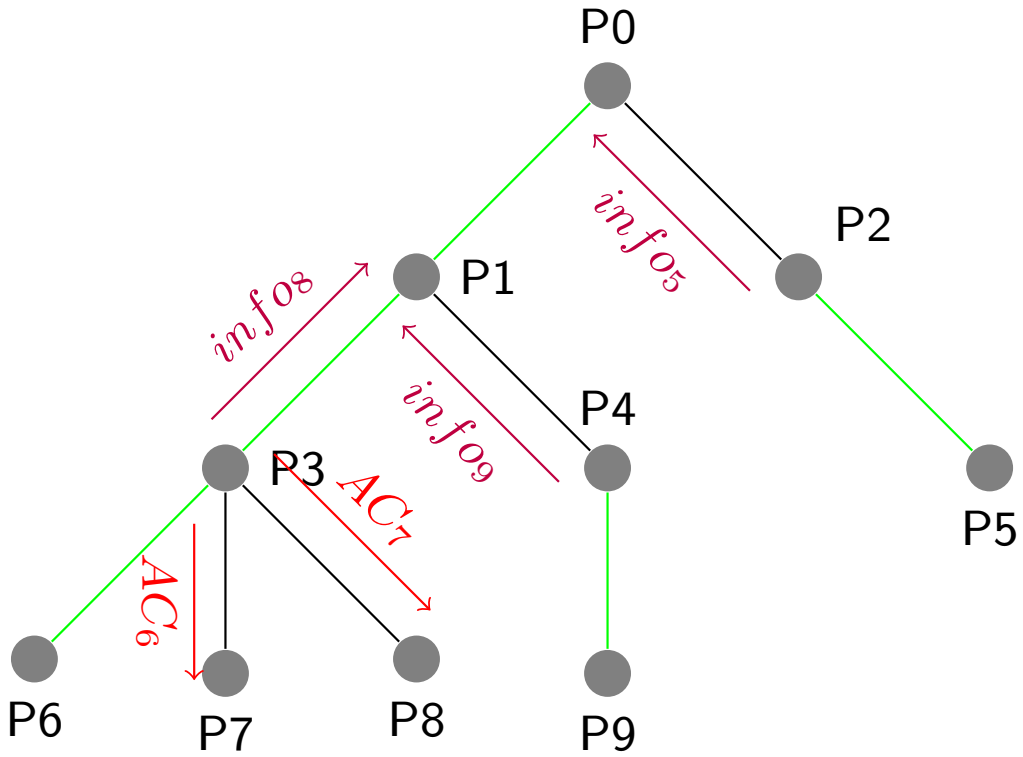
The algorithm



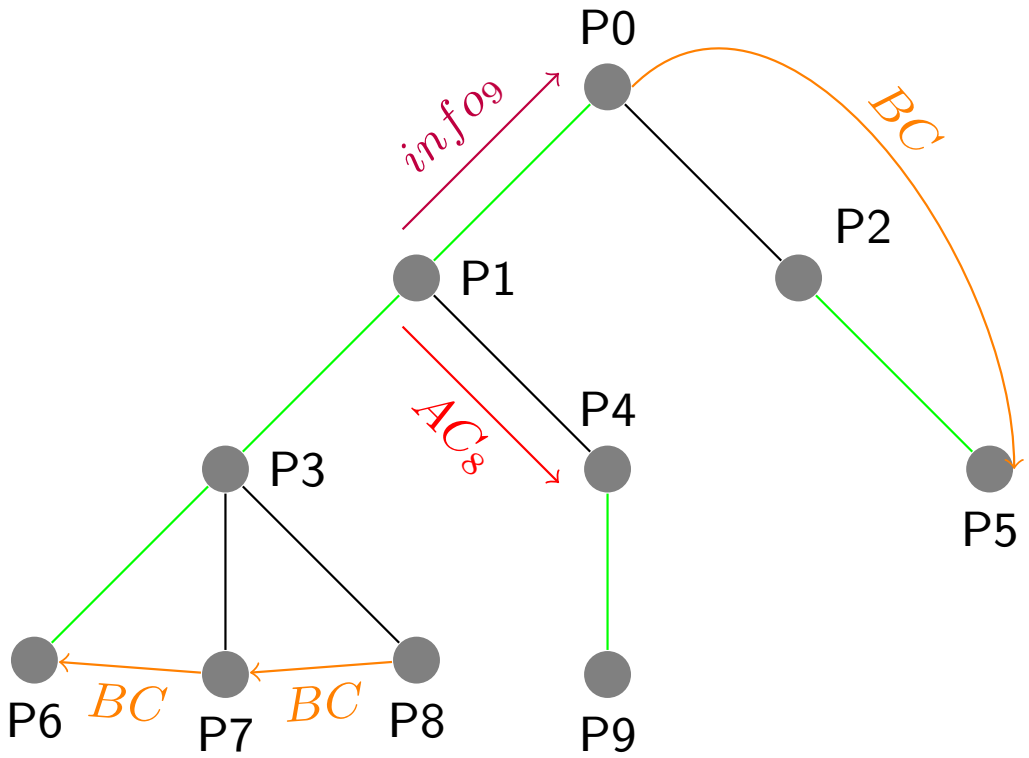
The algorithm



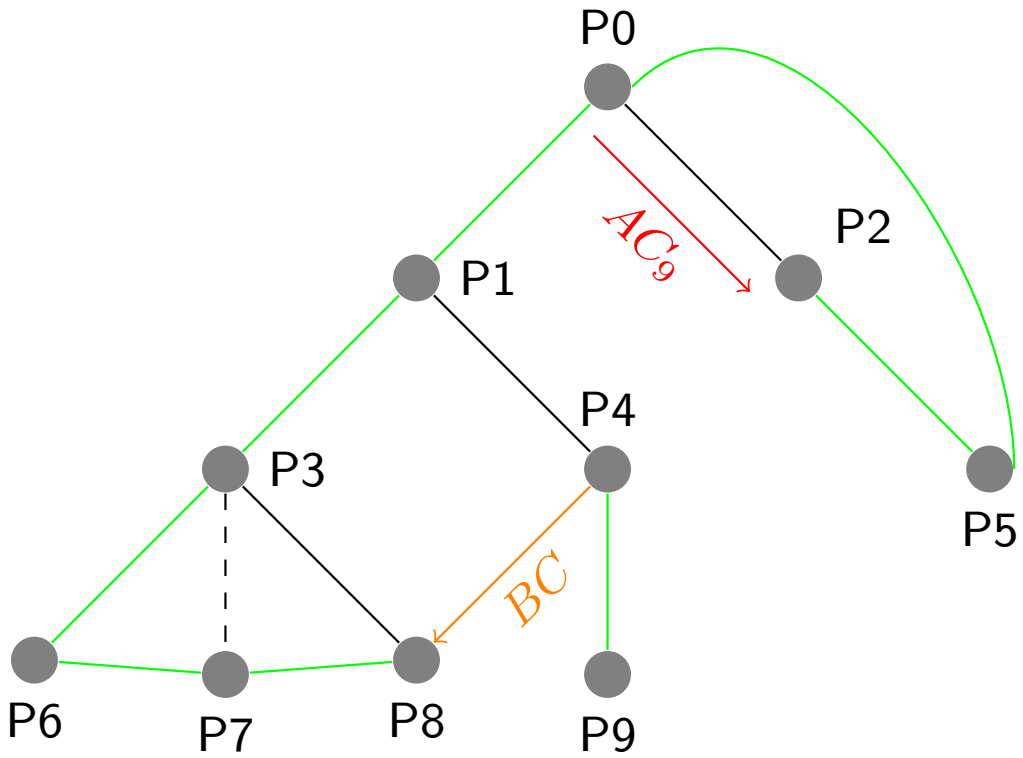
The algorithm



The algorithm



The algorithm



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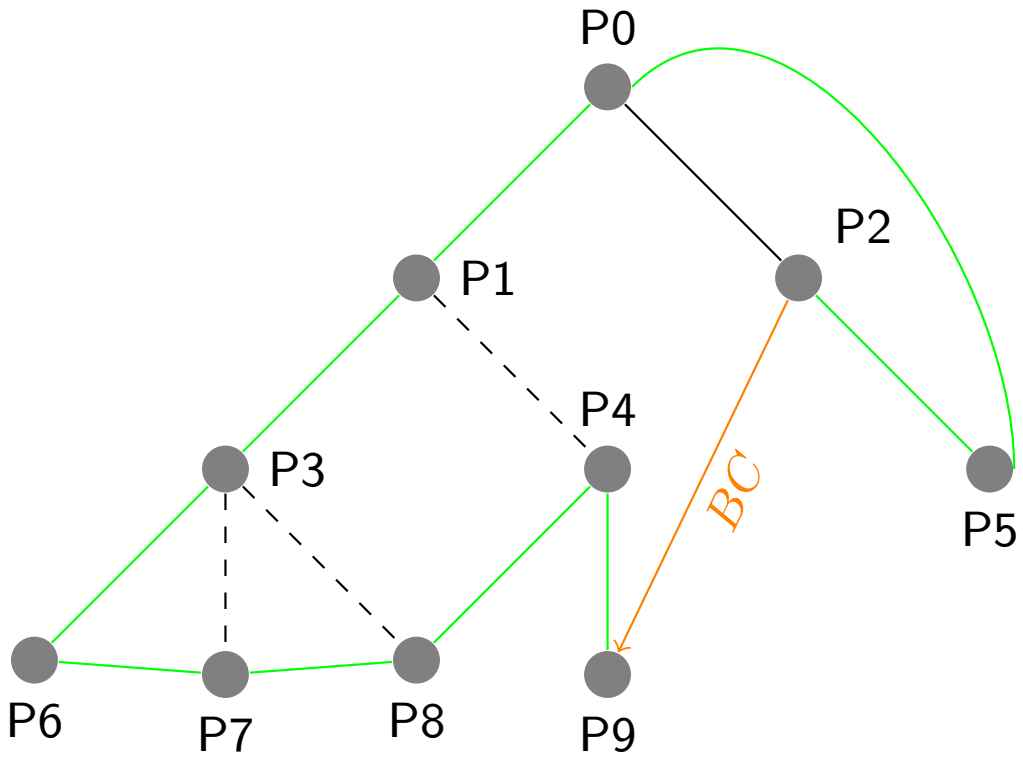

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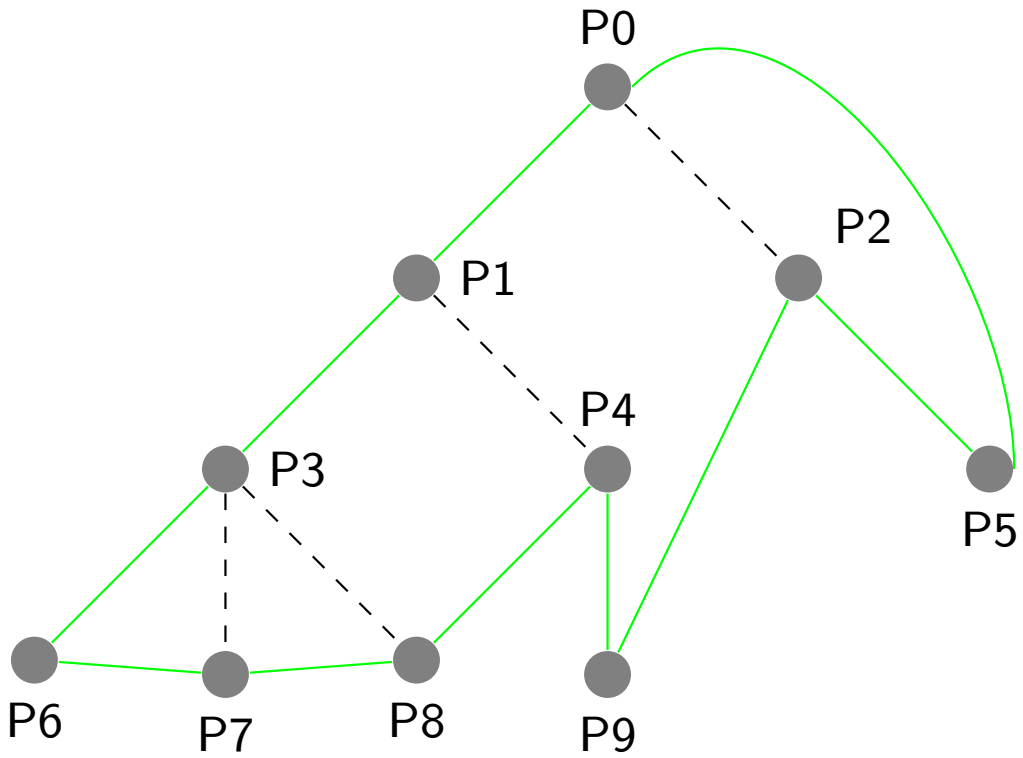

Conclusion

C'est un vieux truc?

Three protocols for fault-tolerant QR factorization of tall-and-skinny matrices

- Cornerstone for general QR factorization
- Three recovery algorithms, one for each semantics

Algorithm for FT update of the trailing matrix

- Fault-tolerant QR for general matrices (R)

Scalable FT protocol based on scalable algorithms

Makes use of new features provided by the MPI-3 standard

- FT API now provided by MPI-3
- *User-Level Failure Mitigation*

Next step:

- Apply this to LU, Cholesky (the other *amigos*)
- Reconstruction of the Householder vectors (Q)
- Full performance analysis

References

- J. Demmel, L. Grigori, M. Hoemmen, & J. Langou: *Communication-avoiding parallel and sequential QR factorizations*, CoRR abs/0806.2159, 2008.
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