

# Existential rules: Intersecting FO-Rewritability and Core Termination

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# Introduction

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# The two classes

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- *FUS*

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- *FUS* — finite unification sets

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- *FUS* — finite unification sets
- *FES*

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- *FUS* — finite unification sets
- *FES* — finite expansion sets

# FUS and FES motivation



- Decidable query entailment

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- Defined by abstract properties

- Decidable query entailment
- Defined by abstract properties
- Undecidable membership

## Finite unification sets

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# FUS and its definitions

- *Bounded derivation depth* property

- *Bounded derivation depth* property
- *Finite unification sets* property





- Infinite chain

- Infinite chain  $\rightarrow$  good

- Infinite chain  $\rightarrow$  good
- Transitive closure

- Infinite chain  $\rightarrow$  good
- Transitive closure  $\rightarrow$  bad

- Infinite chain  $\rightarrow$  good
- Transitive closure  $\rightarrow$  bad
- Propagation

- Infinite chain  $\rightarrow$  good
- Transitive closure  $\rightarrow$  bad
- Propagation  $\rightarrow$  bad

## Finite expansion sets

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# FES and its definitions



- *Finite universal models* property

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- *All-instances core chase termination*

- *Finite universal models* property
- *All-instances core chase termination*
- *Finite expansion sets* property



- Datalog

- Datalog  $\rightarrow$  finite universal model

- Datalog  $\rightarrow$  finite universal model  $\rightarrow$  good

- Datalog  $\rightarrow$  finite universal model  $\rightarrow$  good
- Infinite chain



- Datalog  $\rightarrow$  finite universal model  $\rightarrow$  good
- Infinite chain  $\rightarrow$  bad

- Datalog  $\rightarrow$  finite universal model  $\rightarrow$  good
- Infinite chain  $\rightarrow$  bad
- Infinite chain with a loop

- Datalog  $\rightarrow$  finite universal model  $\rightarrow$  good
- Infinite chain  $\rightarrow$  bad
- Infinite chain with a loop  $\rightarrow$  good

## Intersecting FUS and FES

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- *FUS* — Finite unification sets

- *FUS* — Finite unification sets
- *FES* — Finite expansion sets

- *FUS* — Finite unification sets
- *FES* — Finite expansion sets
- Uniform *FUS* / *FES*



## Uniform FUS / FES — motivation

- Decidable query entailment

- Decidable query entailment
- Defined by abstract property

- Decidable query entailment
- Defined by abstract property
- Decidable membership!

## The FUS / FES conjecture

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- $\text{Local} \cap FES$

- $\text{Local} \cap FES \rightarrow \text{uniform } FES / FUS$



- $\text{Local} \cap FES \rightarrow \text{uniform } FES / FUS$
- Binary  $FUS$

- $\text{Local} \cap FES \rightarrow \text{uniform } FES / FUS$
- $\text{Binary } FUS \rightarrow \text{local}$

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## More about FUS

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## FUS — the width of the rewriting

- Looking at the size of disjuncts

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- Most (all?) known classes have **linear**!



Questions?