## **Complexity of DLs**

## Complexity of DLs: Overview of the Complexity of Concept Consistency

Р	(co-)NP	PSpace	ExpTime	NExpTime
ALN without ⊔	$ALUN$ (NP)without $\exists$ ,only $\neg A$ $ALE$ (co-NP)without $\square$ and NRs,only $\neg A$	$\mathcal{ALCN}$ (wrt acyc. TBoxes) $\mathcal{ALCIQ}_{R^+}$	$\begin{array}{c} \mathcal{ALC}_{reg} \\ \text{add regular roles} \\ \mathcal{ALC}_{u} \\ \text{add universal role} \\ \mathcal{ALC} \\ \text{wrt general TBoxes} \end{array}$	+ $\mathcal{QI}$ still in ExpTime
$\mathcal{FL}_0$	subsumption of $\mathcal{FL}_0$ (co-NP)  wrt acyc. TBoxes	ALCNO ALCO	$\mathcal{ALCHIQ}_{R^+}$ add role hierarchies	
I inverse roles: h-child			ALCIO	ALCIQO
$\mathcal{N}$ NRs: ( $\geq n$ h-child) $\mathcal{Q}$ Qual. NRs: ( $\geq n$ h-child Blond) $\mathcal{O}$ nominals: "John" is a concept $\mathcal{F}$ feature chain (dis)agreement		ALCF —	ALC	$\mathcal{ALC}^{\neg,\cap,\cup}$
• $\mathbf{R}^+$ declare roles as transitive • $\neg, \cap, \cup$ Boolean ops on roles				* ALCF wrt acyc. TBoxes

## Complexity of DLs: What was left out

We left out a variety of complexity results for

- concept consistency of other DLs (e.g., those with "concrete domains")
- "non-standard" inferences such as
  - matching and unification of concepts
  - rewriting concepts
  - least common subsumer (of a set of concepts)
  - most specific concept (of an ABox individual)