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# 1 example1 Theory

**Built:** 29 October 2017

**Parent Theories:** aclDrules

## 1.1 Datatypes

*commands* = go | nogo | launch | abort

*staff* = Alice | Bob | Carol | Dan

## 1.2 Theorems

[example1Theorem]

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go}$

[example1TheoremA]

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go}$

[example1TheoremB]

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go}$

[example2Theorem]

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice speaks_for Name Bob} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Bob controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go}$

[example2TheoremA]

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice speaks_for Name Bob} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Bob controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go}$

[example2TheoremB]

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice speaks_for Name Bob} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Bob controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go}$

**[example3Theorem]**

$\vdash (M, Oi, Os) \text{ sat prop go impf prop launch} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Carol says prop launch}$

**[example3TheoremA]**

$\vdash (M, Oi, Os) \text{ sat prop go impf prop launch} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Carol says prop launch}$

**[MonoXXRepsXXTheorem]**

$\vdash (M, Oi, Os) \text{ sat } Q \text{ controls } f \Rightarrow$   
 $(M, Oi, Os) \text{ sat reps } P \ Q \ f \Rightarrow$   
 $(M, Oi, Os) \text{ sat } P' \text{ quoting } Q' \text{ says } f \Rightarrow$   
 $(M, Oi, Os) \text{ sat } P' \text{ speaks\_for } P \Rightarrow$   
 $(M, Oi, Os) \text{ sat } Q' \text{ speaks\_for } Q \Rightarrow$   
 $(M, Oi, Os) \text{ sat } f$

## 2 solutions1 Theory

**Built:** 29 October 2017

**Parent Theories:** example1

### 2.1 Theorems

**[aclExercise1]**

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat}$   
 $\text{Name Alice says prop go andf Name Alice controls prop go}$

**[aclExercise1A]**

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Bob says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice meet Name Bob says prop go}$

**[aclExercise2]**

$\vdash (M, Oi, Os) \text{ sat Name Bob says prop launch}$

**[aclExercise2A]**

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice controls prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat prop go impf prop launch} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Bob says prop launch}$

**[aclExercise2B]**

$\vdash (M, Oi, Os) \text{ sat Name Alice says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Bob says prop go} \Rightarrow$   
 $(M, Oi, Os) \text{ sat Name Alice meet Name Bob says prop go}$

### 3 conops0Solution Theory

**Built:** 29 October 2017

**Parent Theories:** aclDrules

#### 3.1 Datatypes

*commands* = go | nogo | launch | abort | activate | stand\_down

*keyPrinc* = Staff people | Role roles | Ap num

*people* = Alice | Bob

*principals* = PR keyPrinc | Key keyPrinc

*roles* = Commander | Operator | CA

#### 3.2 Theorems

[ApRuleActivateXXthm]

```
⊢ (M, Oi, Os) sat
  Name (PR (Role Operator)) controls prop launch ⇒
  (M, Oi, Os) sat
  reps (Name (PR (Staff Bob))) (Name (PR (Role Operator)))
    (prop launch) ⇒
  (M, Oi, Os) sat
  Name (Key (Staff Bob)) quoting Name (PR (Role Operator)) says
  prop launch ⇒
  (M, Oi, Os) sat prop launch impf prop activate ⇒
  (M, Oi, Os) sat
  Name (Key (Role CA)) speaks_for Name (PR (Role CA)) ⇒
  (M, Oi, Os) sat
  Name (Key (Role CA)) says
  Name (Key (Staff Bob)) speaks_for Name (PR (Staff Bob)) ⇒
  (M, Oi, Os) sat
  Name (PR (Role CA)) controls
  Name (Key (Staff Bob)) speaks_for Name (PR (Staff Bob)) ⇒
  (M, Oi, Os) sat prop activate
```

[ApRuleStandDownXXthm]

```
⊢ (M, Oi, Os) sat Name (PR (Role Operator)) controls prop abort ⇒
  (M, Oi, Os) sat
  reps (Name (PR (Staff Bob))) (Name (PR (Role Operator)))
    (prop abort) ⇒
  (M, Oi, Os) sat
  Name (Key (Staff Bob)) quoting Name (PR (Role Operator)) says
  prop abort ⇒
  (M, Oi, Os) sat prop abort impf prop stand_down ⇒
```

```

(M, Oi, Os) sat
Name (Key (Role CA)) speaks_for Name (PR (Role CA)) ⇒
(M, Oi, Os) sat
Name (Key (Role CA)) says
Name (Key (Staff Bob)) speaks_for Name (PR (Staff Bob)) ⇒
(M, Oi, Os) sat
Name (PR (Role CA)) controls
Name (Key (Staff Bob)) speaks_for Name (PR (Staff Bob)) ⇒
(M, Oi, Os) sat prop stand_down

```

#### [OpRuleAbortXXthm]

```

⊢ (M, Oi, Os) sat Name (PR (Role Commander)) controls prop nogo ⇒
(M, Oi, Os) sat
reps (Name (PR (Staff Alice))) (Name (PR (Role Commander)))
(prop nogo) ⇒
(M, Oi, Os) sat
Name (Key (Staff Alice)) quoting
Name (PR (Role Commander)) says prop nogo ⇒
(M, Oi, Os) sat prop nogo impf prop abort ⇒
(M, Oi, Os) sat
Name (Key (Role CA)) speaks_for Name (PR (Role CA)) ⇒
(M, Oi, Os) sat
Name (Key (Role CA)) says
Name (Key (Staff Alice)) speaks_for Name (PR (Staff Alice)) ⇒
(M, Oi, Os) sat
Name (Key (Staff Bob)) quoting Name (PR (Role Operator)) says
prop abort

```

#### [OpRuleLaunchXXthm]

```

⊢ (M, Oi, Os) sat Name (PR (Role Commander)) controls prop go ⇒
(M, Oi, Os) sat
reps (Name (PR (Staff Alice))) (Name (PR (Role Commander)))
(prop go) ⇒
(M, Oi, Os) sat
Name (Key (Staff Alice)) quoting
Name (PR (Role Commander)) says prop go ⇒
(M, Oi, Os) sat prop go impf prop launch ⇒
(M, Oi, Os) sat
Name (Key (Role CA)) speaks_for Name (PR (Role CA)) ⇒
(M, Oi, Os) sat
Name (Key (Role CA)) says
Name (Key (Staff Alice)) speaks_for Name (PR (Staff Alice)) ⇒
(M, Oi, Os) sat
Name (PR (Role CA)) controls
Name (Key (Staff Alice)) speaks_for Name (PR (Staff Alice)) ⇒
(M, Oi, Os) sat
Name (Key (Staff Bob)) quoting Name (PR (Role Operator)) says
prop launch

```

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