

18734 Recitation

- English \rightarrow Logic \rightarrow REDUCE language
- Homework 1 clarifications

Project

- Reminder for finalizing teams and deciding on a project

Logging in

■ possibility.cylab.cmu.edu

A covered entity may disclose an individual's protected health information (phi) to law-enforcement officials for the purpose of identifying an individual if the individual made a statement admitting participation in a violent crime that the covered entity believes may have caused serious physical harm to the victim

send(p1, p2, m): p1 sends message m to p2.

tagged(m, q, t, u): m is a message containing information with attributes t about q with purpose u.

inrole(p2, law-enforcement-official): p2 has the role 'law-enforcement-official'.

attr_in(t, phi): t contains 'protected health information'.

purp_in(u, id-criminal): purpose u is identifying a criminal.

state(q, m'): q states m'.

is-admission-of-crime(m'): m' is an admission of crime.

believes-crime-caused-serious-harm(p1, q, m'): p1 believes q may have caused serious harm.

A covered entity may disclose an individual's protected health information (phi) to law-enforcement officials for the purpose of identifying an individual if the individual made a statement admitting participation in a violent crime that the covered entity believes may have caused serious physical harm to the victim

$\forall p1, p2, m, u, q, t.$

$(\text{send}(p1, p2, m)$

$\wedge \text{tagged}(m, q, t, u)$

$\wedge \text{attr_in}(t, \text{phi}))$

\supset

$\text{inrole}(p1, \text{covered-entity}) \wedge \text{inrole}(p2, \text{law-enforcement-official})$

$\wedge (\text{purp_in}(u, \text{id-criminal}))$

$\wedge \exists m'. \text{state}(q, m') \wedge \text{is-admission-of-crime}(m')$

$\wedge \text{believes-crime-caused-serious-harm}(p1, q, m')$

A covered health care provider providing emergency health care in response to a medical emergency, other than such emergency on the premises of the covered health care provider, may disclose protected health information to a law enforcement official if such disclosure appears necessary to alert law enforcement to:

- (A) The commission and nature of a crime;
- (B) The location of such crime or of the victim(s) of such crime; and
- (C) The identity, description, and location of the perpetrator of such crime

send(p1, p2, m) tagged(m, q, t, u) attr_in(t, phi)

inrole(p2, <roles>): Two concrete roles to be used are "health-care-provider" and "law-enforcement-official"

purp_in(u, <purpose>): One concrete purpose is "alert"

providing-emergency-healthcare(p1, q): p1 is providing emergency healthcare to q.

appears-necessary(p1, p2, q, t, u): p1 thinks it is necessary to alert of crime-commission-location-victims-perpetrator to p2 with message about q with attribute t and purpose u.

Answer?

Answer?

$\forall p1, p2, m, u, q, t.$

$(\text{send}(p1, p2, m)$

$\wedge \text{tagged}(m, q, t, u)$

$\wedge \text{attr_in}(t, \text{phi}))$

\supset

$\text{inrole}(p1, \text{health-care-provider})$

$\wedge \text{inrole}(p2, \text{law-enforcement-official})$

$\wedge (\text{purp_in}(u, \text{alert}))$

$\wedge \text{providing-emergency-healthcare}(p1, q)$

$\wedge \text{appears-necessary}(p1, p2, q, t, u)$

Policy Composition

Norms of transmission in privacy laws

Positive norms, φ_i^+ : Transmission *may occur* if condition is satisfied.

- ▶ “A covered entity may disclose protected health information for treatment activities [...]” [HIPAA §164.506(c)(2)]

Negative norms, φ_j^- : Condition *must be satisfied* if transmission occurs.

- ▶ “A covered entity must obtain an authorization for any use or disclosure of psychotherapy notes.” [HIPAA §164.508(a)(2)]

A transmission is lawful if and only if it satisfies at least one of the law’s positive norms and all of the law’s negative norms.

$$\text{maysend}(p_1, p_2, m) \triangleq \left(\bigvee_i \varphi_i^+ \right) \wedge \left(\bigwedge_j \varphi_j^- \right)$$

$$\mathbf{G} \left(\forall p_1, p_2, m. \left(\text{send}(p_1, p_2, m) \supset \text{maysend}(p_1, p_2, m) \right) \right).$$

$\forall p1, p2, m, u, q, t.$
(send(p1, p2, m)
 \wedge tagged(m, q, t, u)
 \wedge attr_in(t, phi))
 \supset

inrole(p1, covered-entity) \wedge inrole(p2, law-enforcement-official)
 \wedge (purp_in(u, id-criminal))
 \wedge $\exists m'. \diamond \text{state}(q, m') \wedge \text{is-admission-of-crime}(m')$
 \wedge believes-crime-caused-serious-harm(p1, q, m')

$\forall p1, p2, m, u, q, t.$
(send(p1, p2, m)
 \wedge tagged(m, q, t, u)
 \wedge attr_in(t, phi))
 \supset

inrole(p1, health-care-provider)
 \wedge inrole(p2, law-enforcement-official)
 \wedge (purp_in(u, alert))
 \wedge providing-emergency-healthcare(p1, q)
 \wedge appears-necessary(p1, p2, q, t, u)

$\forall p1, p2, m, u, q, t.$

(send(p1, p2, m)

\wedge tagged(m, q, t, u)

\wedge attr_in(t, phi))

\supset (

inrole(p1, covered-entity) \wedge inrole(p2, law-enforcement-official)

\wedge (purp_in(u, id-criminal))

$\wedge \exists m'. \diamond \text{state}(q, m') \wedge \text{is-admission-of-crime}(m')$

$\wedge \text{believes-crime-caused-serious-harm}(p1, q, m')$

)

\vee

(

inrole(p1, health-care-provider)

\wedge inrole(p2, law-enforcement-official)

\wedge (purp_in(u, alert))

\wedge providing-emergency-healthcare(p1, q)

\wedge appears-necessary(p1, p2, q, t, u)

)

Another Example

A covered entity may disclose protected health information to a coroner or medical examiner for the purpose of identifying a deceased person, determining a cause of death, or other duties as authorized by law. A covered entity that also performs the duties of a coroner or medical examiner may use protected health information for the purposes described in this paragraph.

Answer?

Answer?

```
inrole(p1, covered-entity)
  ∧ ( (inrole(p2, coroner)
      ∨ inrole(p2, medical-examiner)
    )
  ∧ belongstorole(q, deceased)
  ∧ ( purp_in(identification(q))
      ∨ purp_in(determining-cause-of-death(q))
      ∨ authorized-by-law(p2;u)
    )
  )
```

Prefix (Polish) Notation

- Infix: $3+4$, Prefix $+3\ 4$, Postfix: $3\ 4\ +$
- REDUCE understands prefix notation

infix	prefix(ish)
(a) and (b)	and (a) (b)
(a) or (b)	or (a) (b)
(a) imp (b)	imp (a) (b)
(a) plus (b)	plus (a) (b)
$\forall x, y. c(x, y) \supset B(x, y)$	all $[x][y]$ $(c(x, y))$ $(B(x, y))$
$\exists x, y. c(x, y) \wedge b(x, y)$	ex $[x][y]$ $(c(x, y))$ $(b(x, y))$
predicate-name(arg1, ...)	(predicate-name arg1 ...)

Convert to prefix notation

$\forall p1, p2, m, u, q, t.$

$(\text{send}(p1, p2, m)$

$\wedge \text{tagged}(m, q, t, u)$

$\wedge \text{attr_in}(t, \text{phi}))$

\supset

$\text{inrole}(p1, \text{covered-entity}) \wedge \text{inrole}(p2, \text{law-enforcement-official})$

$\wedge (\text{purp_in}(u, \text{id-criminal}))$

$\wedge \exists m'. \text{state}(q, m') \wedge \text{is-admission-of-crime}(m')$

$\wedge \text{believes-crime-caused-serious-harm}(p1, q, m')$

Answer?

Convert to prefix notation

all p1, p2, m, u, q, t.

(and

(send(p1, p2, m))

(tagged(m, q, t, u))

(attr_in(t, phi)))

(and

(inrole(p1, covered-entity))

(inrole(p2, law-enforcement-official))

(purp_in(u, id-criminal))

(ex m'

(state(q,m'))

(and

(is-admission-of-crime(m'))

(believes-crime-caused-serious-harm(p1, q, m'))))