HUMAN-COMPUTER INTERACTION

THIRD EDITION

DIX
FINLAY
ABOWD
BEALE

chapter 16

dialogue notations and design

Dialogue Notations and Design

- Dialogue Notations
  - Diagrammatic
    - state transition networks, JSD diagrams, flow charts
  - Textual
    - formal grammars, production rules, CSP
- Dialogue linked to
  - the semantics of the system – what it does
  - the presentation of the system – how it looks
- Formal descriptions can be analysed
  - for inconsistent actions
  - for difficult to reverse actions
  - for missing actions
  - for potential miskeying errors

what is dialogue?

- conversation between two or more parties
  - usually cooperative
- in user interfaces
  - refers to the *structure* of the interaction
  - syntactic level of human–computer ‘conversation’
- levels
  - lexical – shape of icons, actual keys pressed
  - syntactic – order of inputs and outputs
  - semantic – effect on internal application/data

structured human dialogue

- human-computer dialogue very constrained
- some human-human dialogue formal too …

Minister: do you *man's name* take this woman …
Man: I do
Minister: do you *woman's name* take this man …
Woman: I do
Man: With this ring I thee wed
(places ring on womans finger)
Woman: With this ring I thee wed *(places ring ..)*
Minister: I now pronounce you man and wife

lessons about dialogue

- wedding service
  - sort of script for three parties
  - specifies order
  - some contributions fixed – “I do”
  - others variable – “do you *man’s name* …”
  - instructions for ring
    concurrent with saying words “with this ring …”
- if you say these words are you married?
  - only if in the right place, with marriage licence
  - syntax not semantics

… and more

- what if woman says “I don’t”?
- real dialogues often have alternatives:

Judge: How do you plead guilty or not guilty?

Defendant: *either* Guilty *or* Not guilty

  - the process of the trial depends on the defendants response
- focus on normative responses
  - doesn’t cope with judge saying “off with her head”
  - or in computer dialogue user standing on keyboard!

dialogue design notations

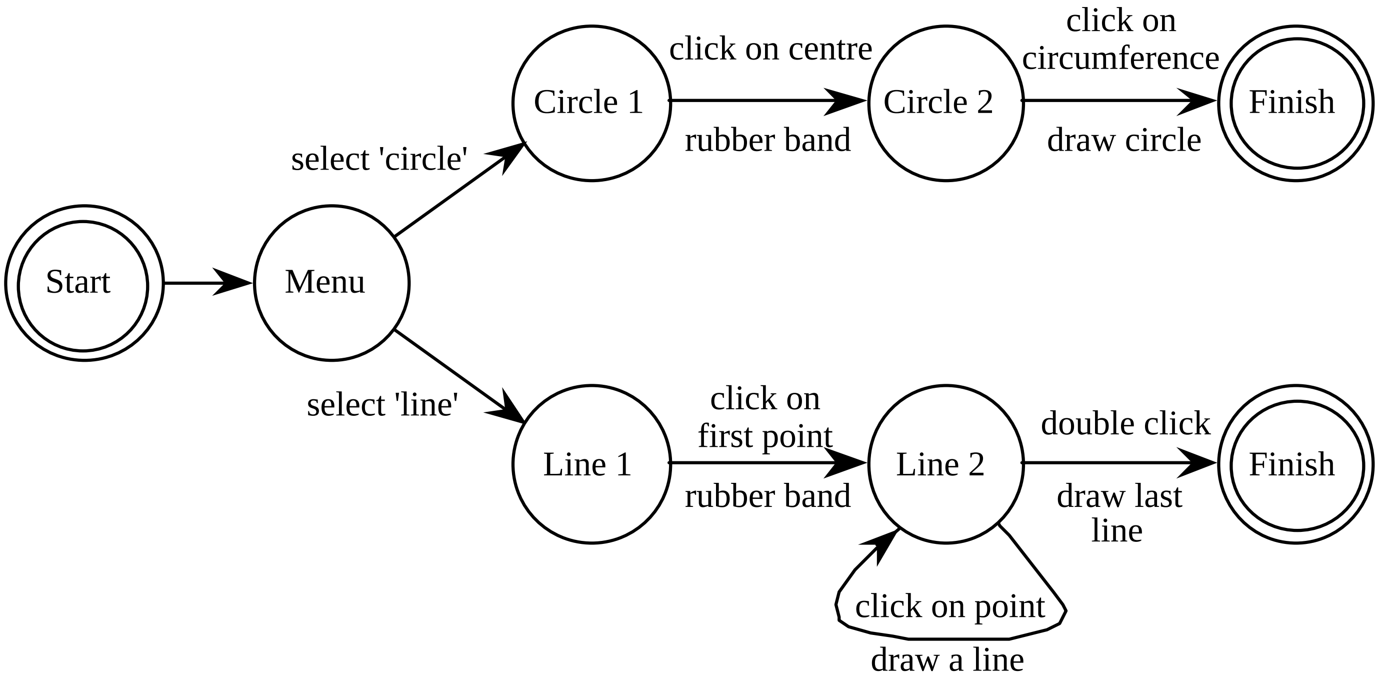
- dialogue gets buried in the program
- in a big system can we:
  - analyse the dialogue:
    - can the user always get to see current shopping basket
  - change platforms (e.g. Windows/Mac)
  - dialogue notations helps us to
    - analyse systems
    - separate lexical from semantic
- … and before the system is built
  - notations help us understand proposed designs

graphical notations

state-transition nets (STN)
Petri nets, state charts
flow charts, JSD diagrams

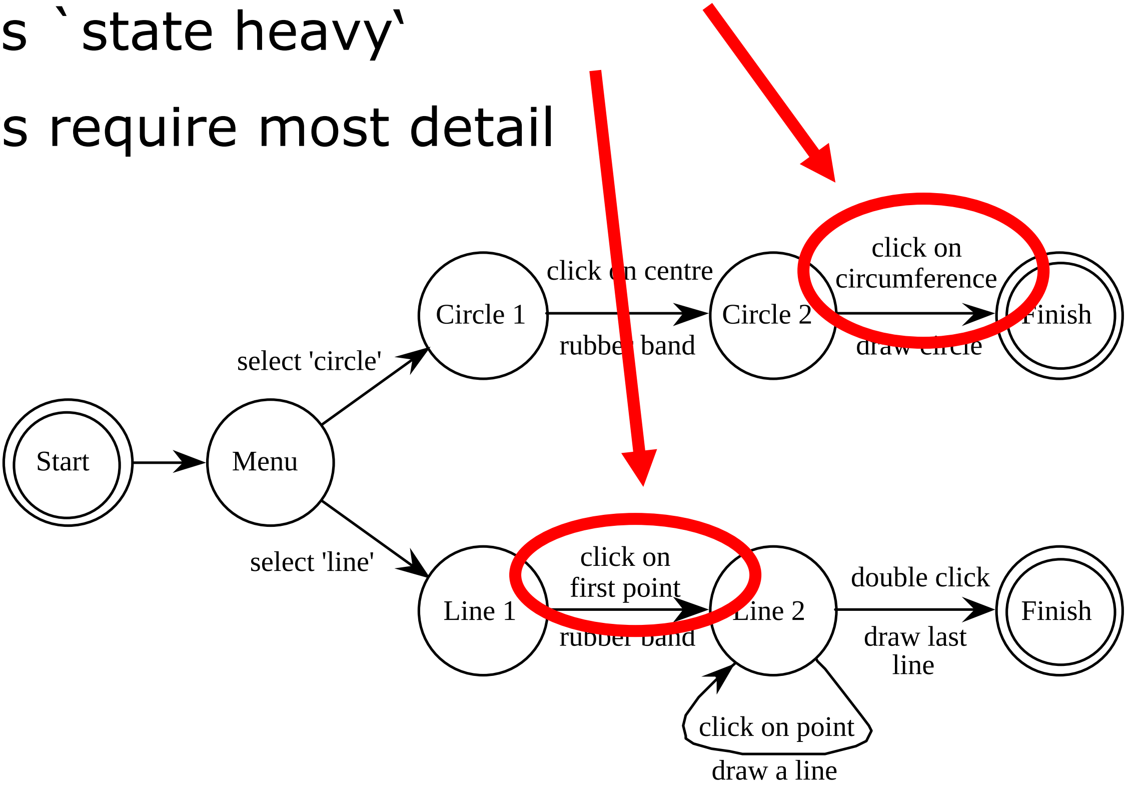
State transition networks (STN)

- circles - states
- arcs - actions/events



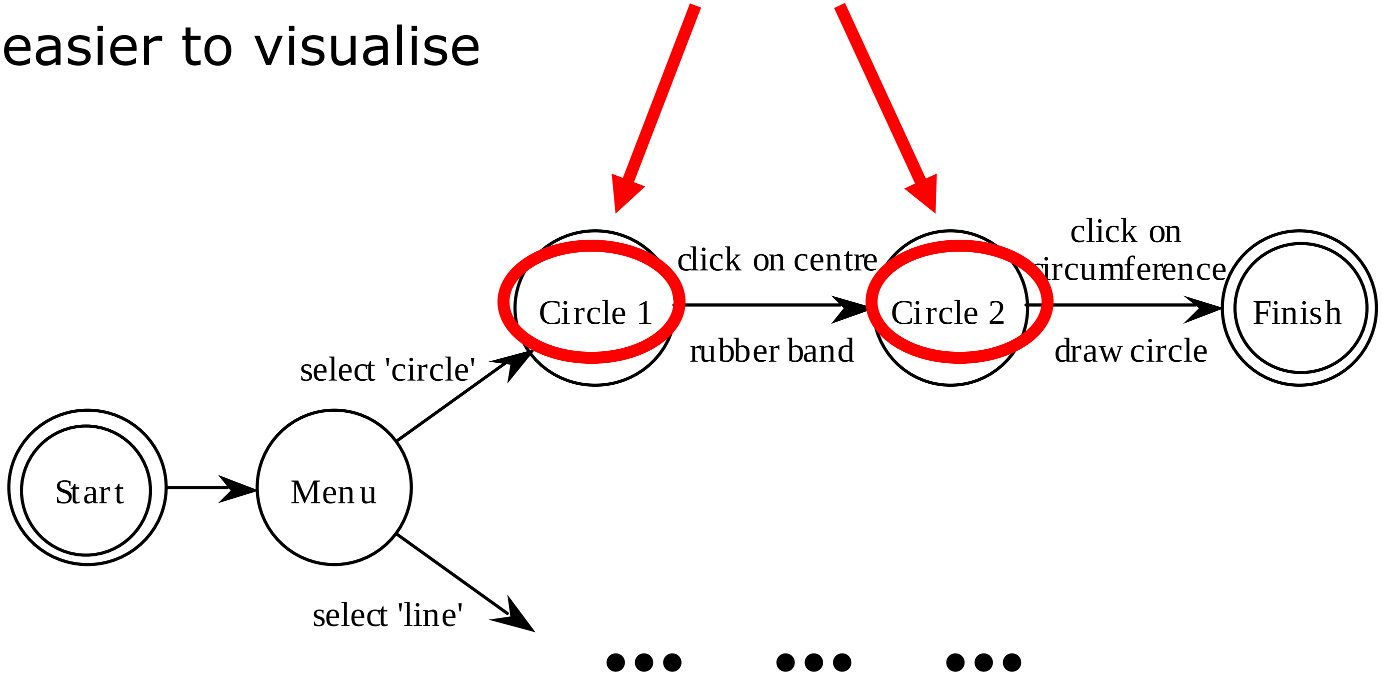
State transition networks - events

- arc labels a bit cramped because:
  - notation is `state heavy‛
  - the events require most detail



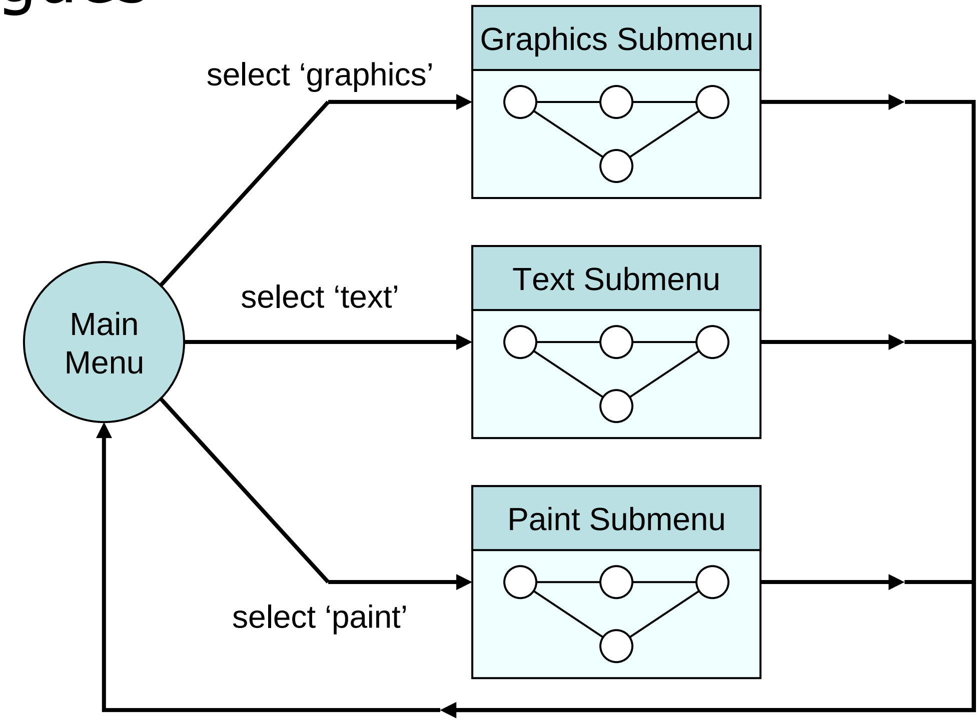
State transition networks - states

- labels in circles a bit uninformative:
  - states are hard to name
  - but easier to visualise



Hierarchical STNs

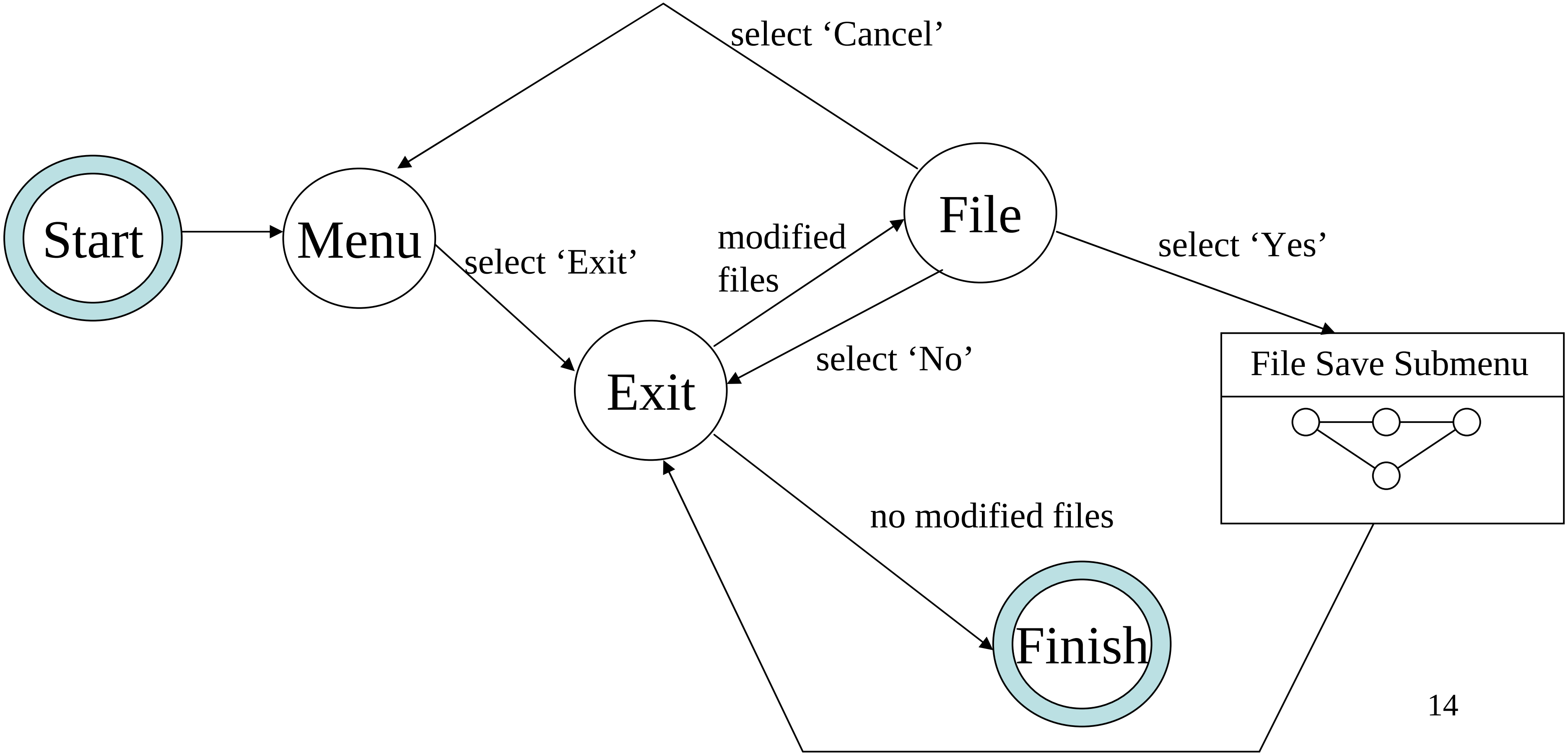
- managing complex dialogues
- named sub-dialogues



Exercise on STNs

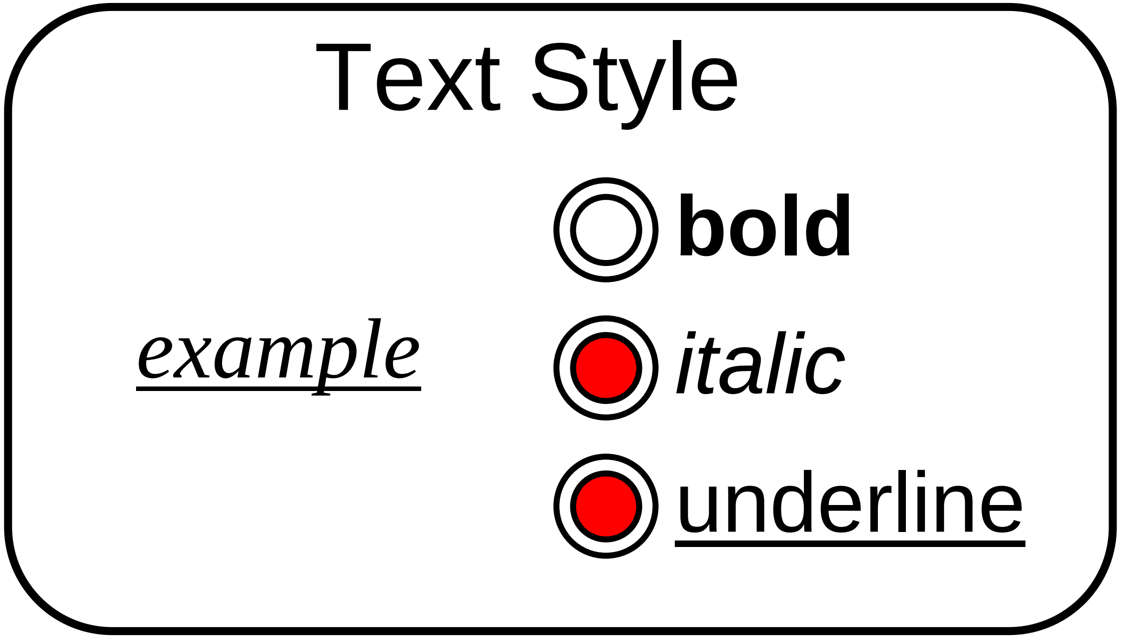
- Model the File | Exit dialogue in MS Word

Exercise on STNs answers



Concurrent dialogues - I

simple dialogue box



Text Style

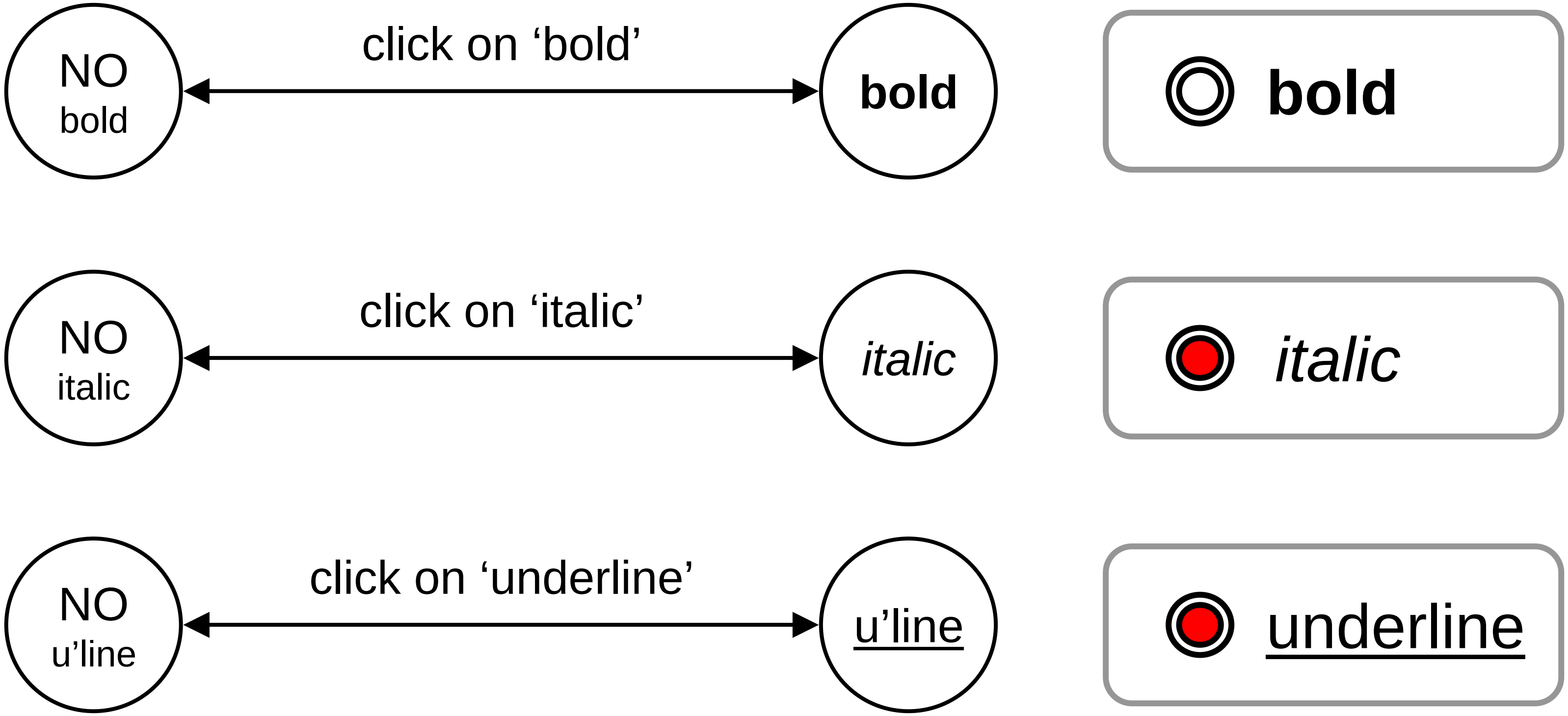
○ **bold**

example ● *italic*

● underline

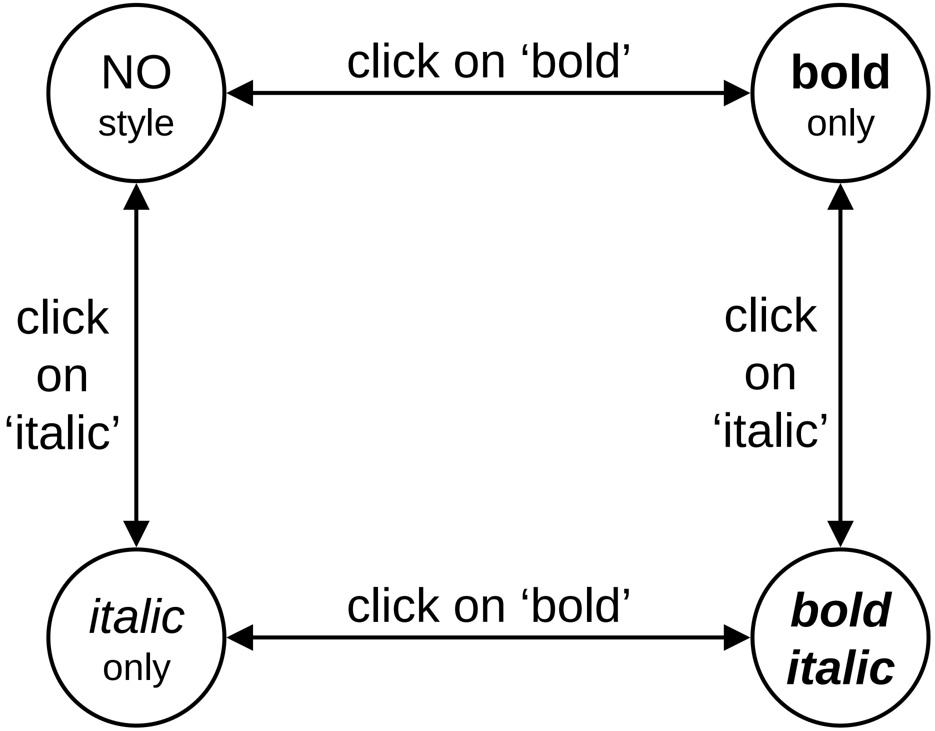
Concurrent dialogues - II

three toggles - individual STNs



Concurrent dialogues - III

bold and italic combined



NO style

click on 'bold'

bold only

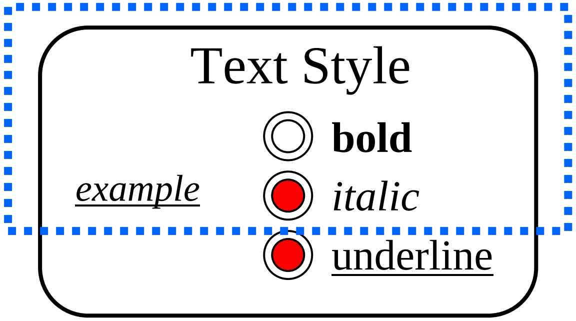
click on 'italic'

click on 'italic'

italic only

click on 'bold'

bold italic



Text Style

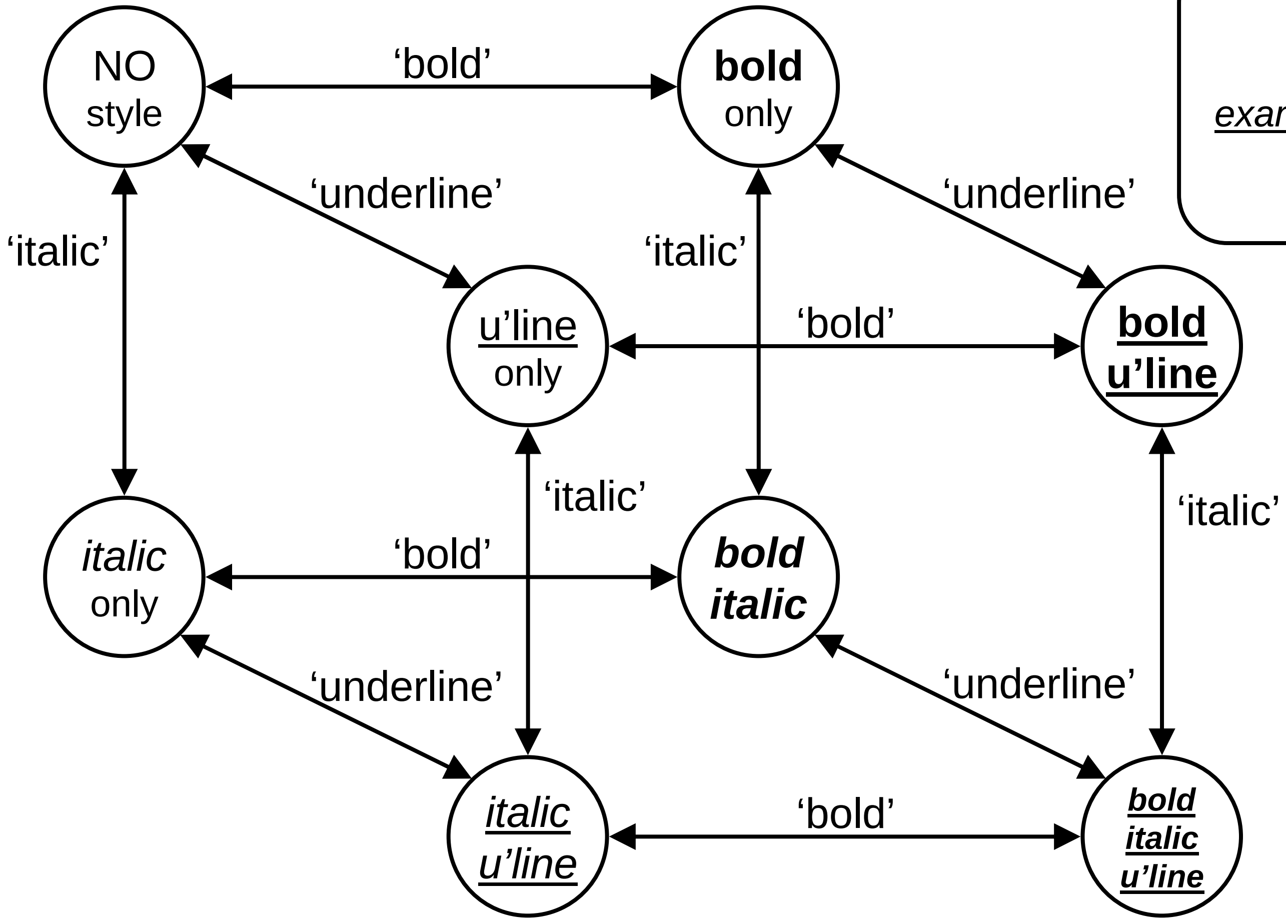
○ **bold**

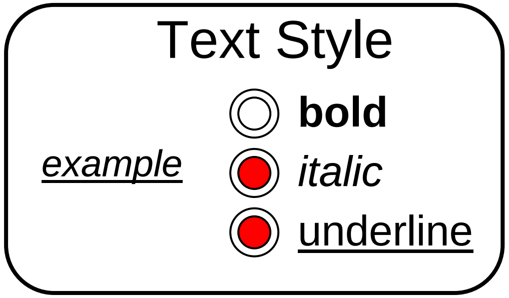
<u>*example*</u> ● *italic*

● <u>underline</u>

Concurrent dialogues - IV

all together - combinatorial explosion





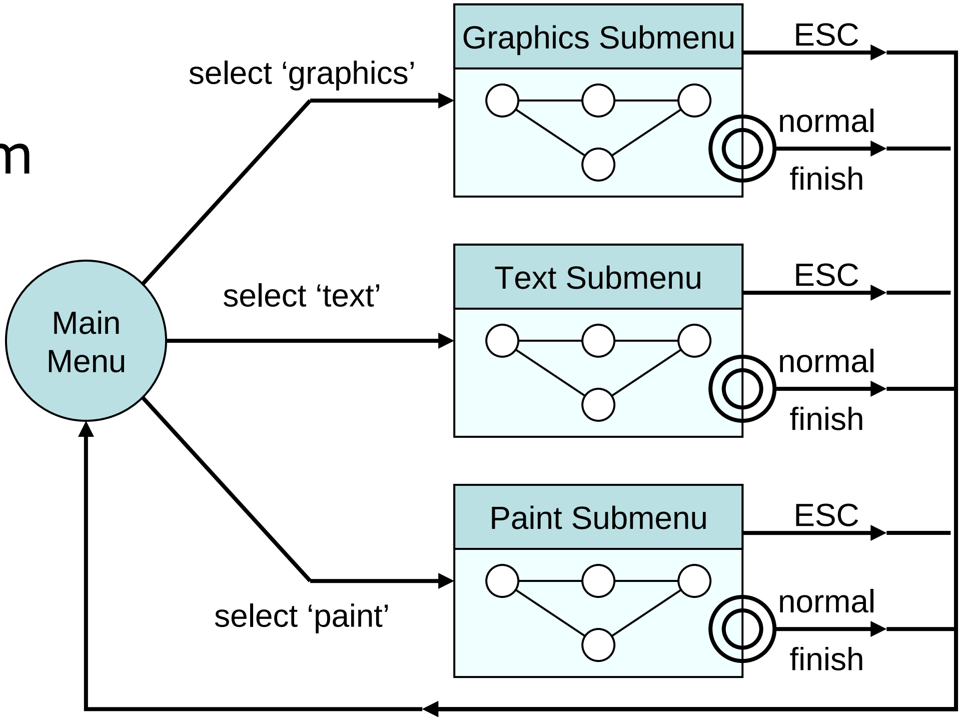
escapes

- ‘back’ in web, escape/cancel keys
  - similar behaviour everywhere
  - end up with spaghetti of identical behaviours
- try to avoid this

e.g. on high level diagram

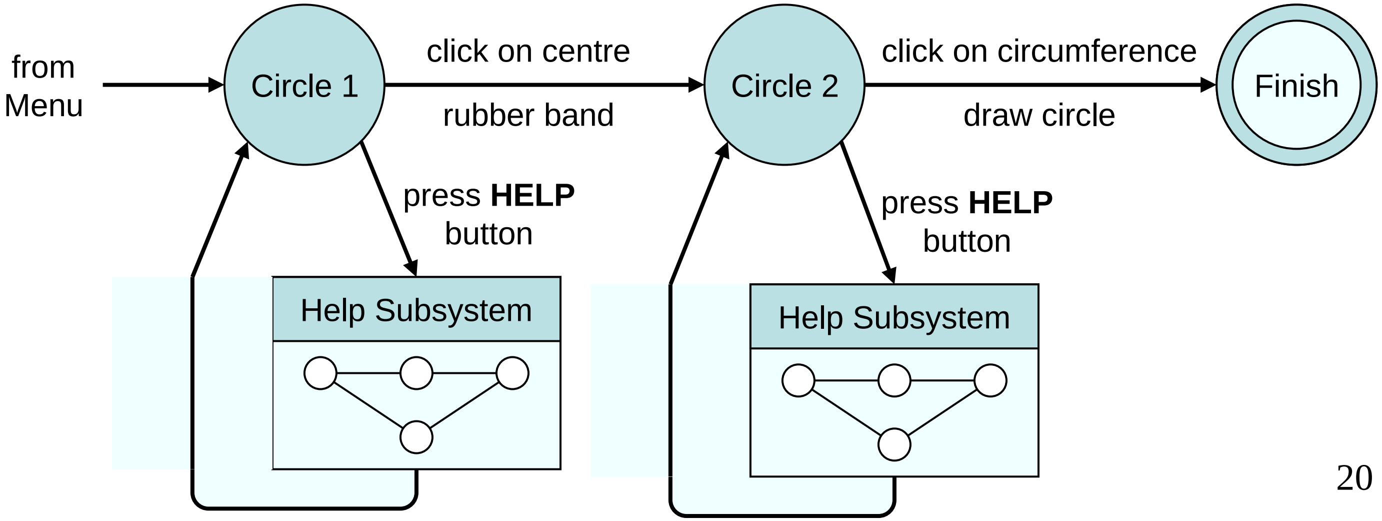
‘normal’ exit for each submenu

plus separate escape arc active ‘everywhere’ in submenu



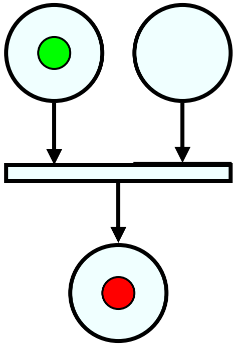
help menus

- similar problems
  - nearly the same everywhere
  - but return to same point in dialogue
  - could specify on STN … but very messy
  - usually best added at a 'meta' level



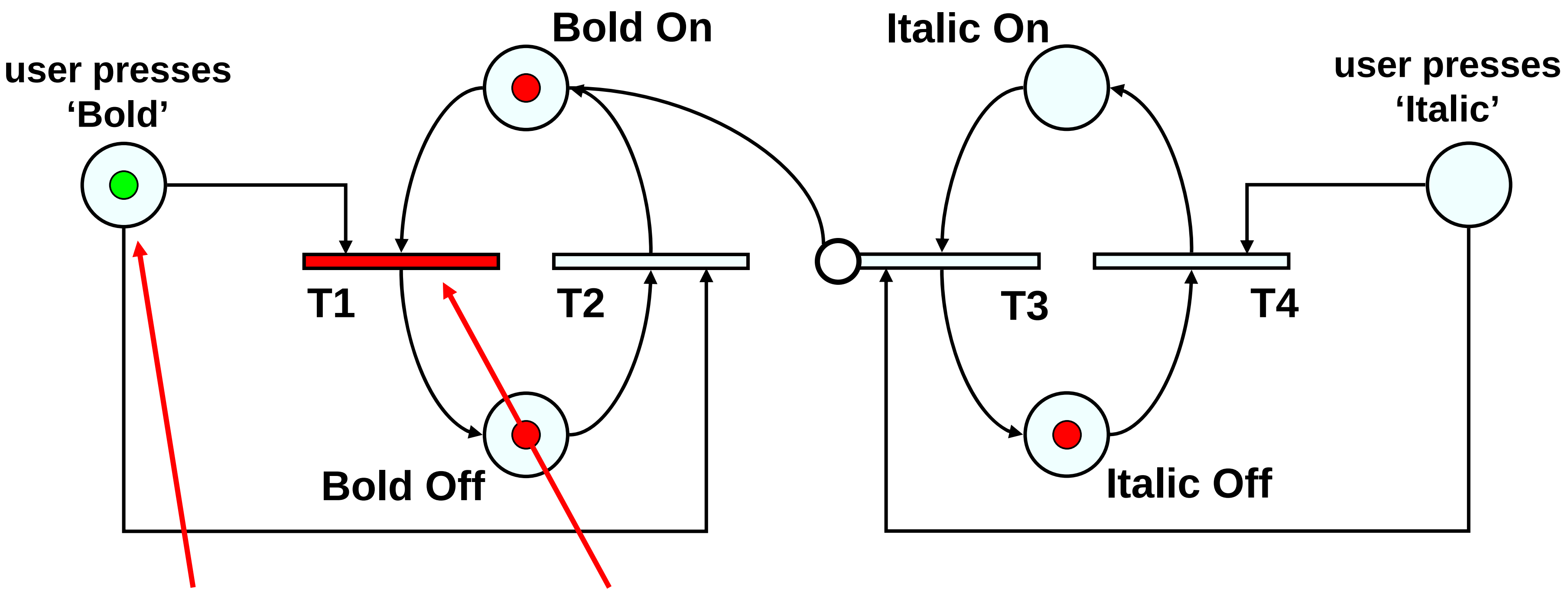
Petri nets

- one of the oldest notations in computing!
- flow graph:
  - places – a bit like STN states
  - transitions – a bit like STN arcs
  - counters – sit on places (current state)



- several counters allowed
  - concurrent dialogue states
- used for UI specification (ICO at Toulouse)
  - tool support – Petshop

Petri net example

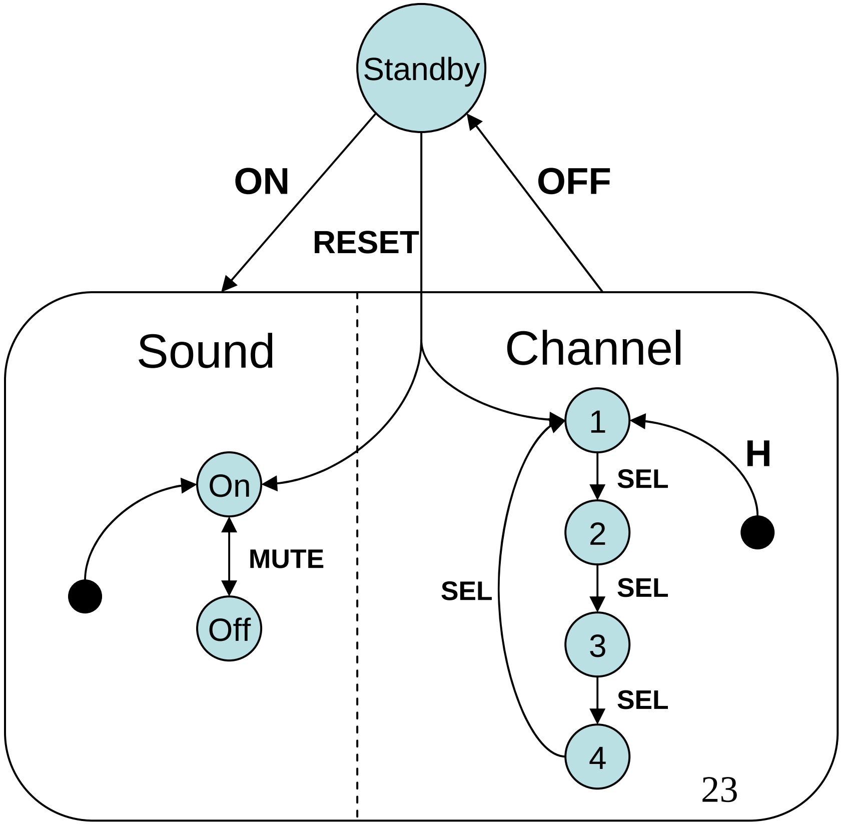


user actions represented as a new counter

transition 'fires' when all input places have counters

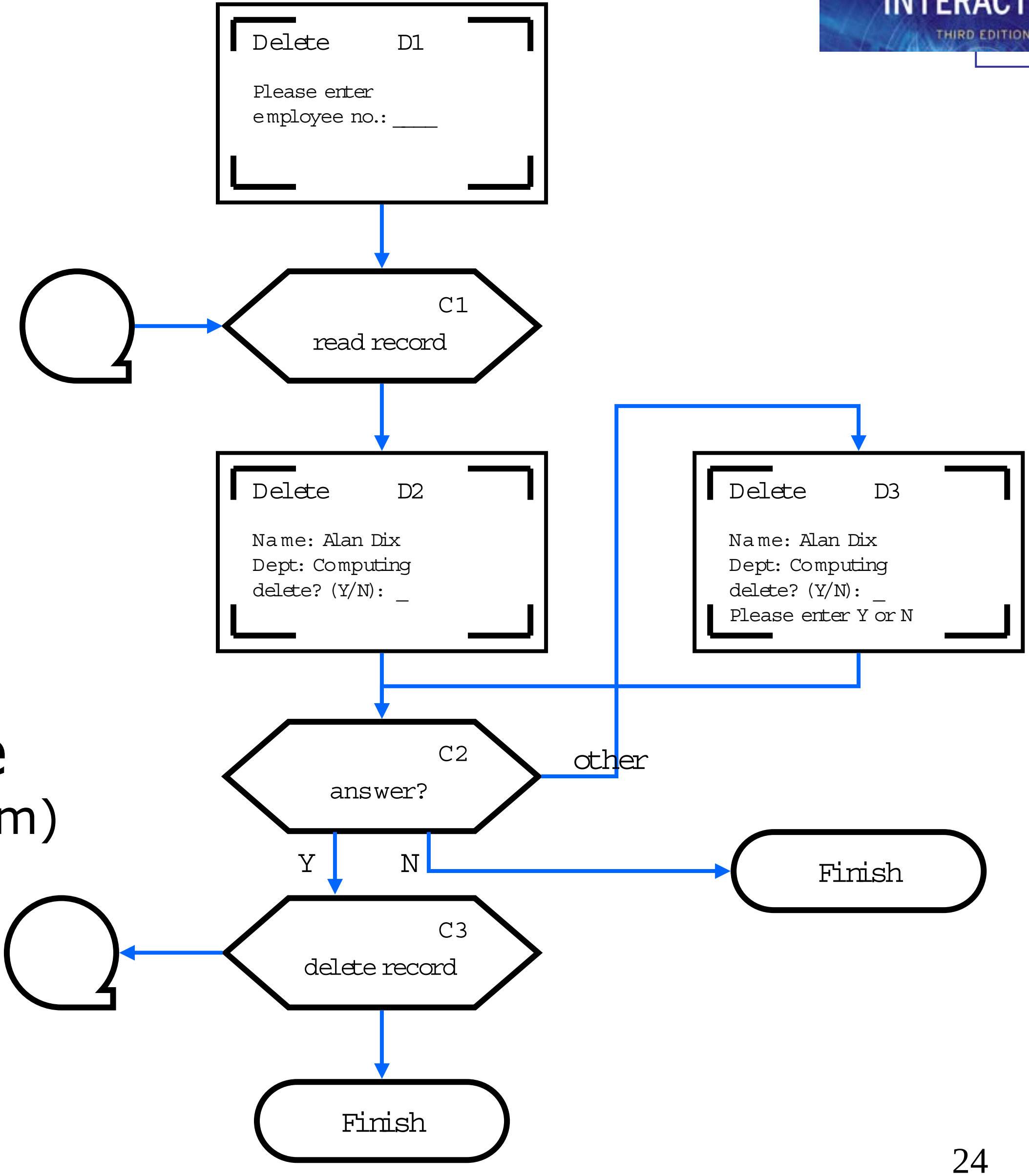
State charts

- used in UML
- extension to STN
  - hierarchy
  - concurrent sub-nets
  - escapes
    - OFF always active
  - history
    - link marked H goes back to last state on re-entering subdialogue



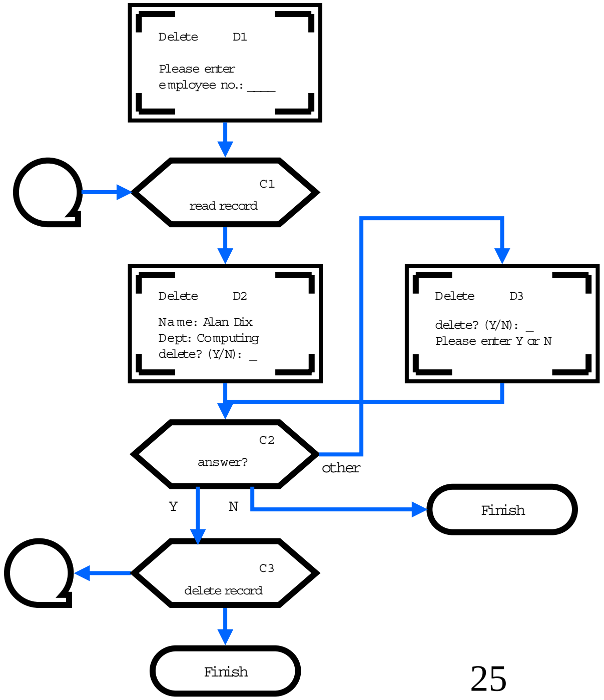
Flowcharts

- familiar to programmers
- boxes
  - process/event
  - not state
- use for dialogue
  (not internal algorithm)



it works! (in the experience of the textbook's authors)

- formal notations – too much work?
- COBOL transaction processing
  - event-driven – like web interfaces
  - programs structure ≠ dialogue structure
- used dialogue flow charts
  - discuss with clients
  - transform to code
  - systematic testing
  - 1000% productivity gain
- formalism saves time!!

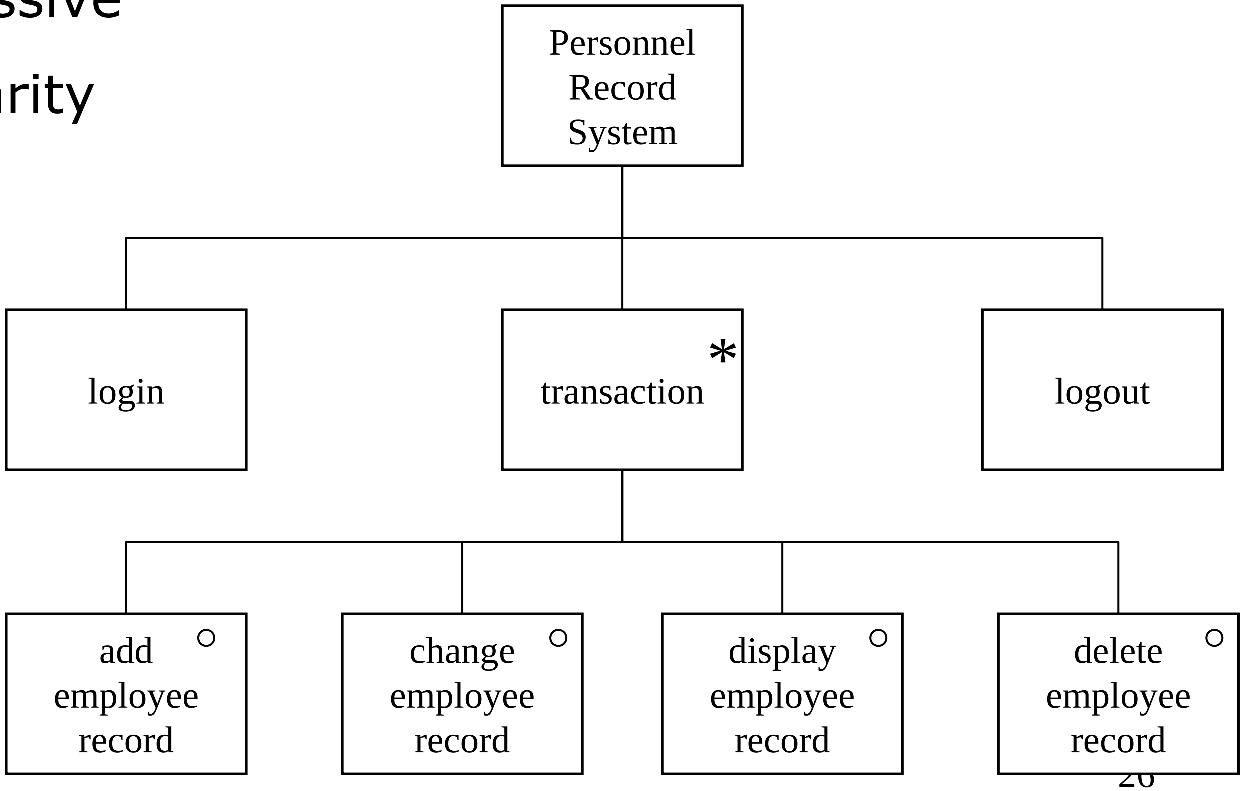


JSD diagrams

- for tree structured dialogues
  - less expressive
  - greater clarity

* = iteration

o = optional element


Personnel Record System
login
transaction *
logout
add employee record o
change employee record o
display employee record o
delete employee record o