

Screening Exam Workshop 2009

Jun 20, 2009
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Exam day is Sept. 11

You have 12 weeks.

**You probably should have
started studying already.**

Why do this workshop?

What we'll cover

- Making and working a study plan
- Should I join/form a study group?
- Question answering strategies
- Exam procedure
- Taking the exam
- Jan 2009 screening exam questions

Exam mechanics

- Six multi-part essay questions on six subjects
- Subjects are: IS302, IS305, IS306, IS328, IS329 and IS360
- Different faculty write the different questions
- Exam is 6 hrs. 3 hrs in the morning and 3 hrs in the afternoon with a 1.5 hr lunch.
- Essays are graded as U (undergraduate), M (masters) or D (doctoral level)
- There are two graders for each question (I think). Graders do not know who you are.
- You need to have 4 questions graded at D and none at U to pass.
- There is a conditional pass option, but you don't want to have to use it.
- The pass rate is around 50%.

- Usually given in ACB 112
- You use a temporary computer account on the lab computers to write your answers
- You write them in MS Word, and draw diagrams with paper and pencil provided to you.
- You'll submit your answers on floppy disks which will also be provided to you.

Your study plan

IS328/329: Management of IT (1)

definitions

- business model
- business process
- business unit
- business state (struggling, etc)
- business orientation: agile, synergistic, autonomous
- business intent: operational excellence, customer intimacy, product leadership
- business environment
- strategic shifts
- operating model: cooperation, unified, replicated, differentiated
- sustainable advantage
- strategic position
- hype cycle
- real time enterprise
- business/IT alignment
- disruptive technology
- balanced scorecard

business strategy

- virtuous cycle
- strategic position
- strategic audit
- porter's 5 forces
- strategic shifts
- value chain analysis
- balanced scorecard
- business maxims
- organizational models
- business network/extended enterprise/ecosystem

value of IT

- carr's argument
- applegate's response (IT creates options)
- strassman's response (IT more than hw & sw, gives differentiation as part of a process and context)

business and IT strategy

- questions in analyzing how IT can open opportunities
- questions in analyzing how IT cause risk
- Broadbent's IT service groups

role of the cio

- everything from business and IT strategy
- relationship with the ceo, cxo
- know the environment
- trend-centric view
- lead through influence
- create appropriate IT governance
- business/IT alignment
- manage your project portfolio
- sound financial basis: make costs visible

outsourcing

- network service models
- incremental outsourcing
- outsourcing contracts
- when to outsource
- when not to outsource
- long term outsourcing/strategic partnerships
- offshoring
- relationship management
- good things to outsource

enterprise architecture

- foundation for execution
- centralization vs. decentralization
- architecture maturity: silos, standardization, optimized core, business modularity

models

- Mcfarlan's strategic grid
- Porter's 5 forces
- virtuous cycle
- balanced scorecard
- SWOT
- Henderson and Venkatraman's Strategic Alignment model.
- Schwalbe's four frames (systems view of the org)
- Schwalbe and Applegate organizational models

governance

- Why good governance is important
- encourages trust of IT
- business/IT alignment
- encourages good use of IT throughout enterprise
- means better IT delivery (business/IT alignment again)
- Signs of good governance
- high level executive participation
- clear business goals for it investment
- formal exception process
- few changes from year to year
- formal methods of communication
- governance domains
- IT maxims (business/IT alignment)
- IT architecture: guidelines and standards
- IT infrastructure strategies: extent of shared services
- Business application needs: what applications are needed
- IT investment and prioritization
- governance models
- governance mechanisms
- inter-organizational governance
- research frameworks and issues
- practical issues

project management

- waterfall phases

IS302: Databases (1)

definitions

- database
- normalization
- functional dependency
- irreducibly dependent
- ACID: atomicity, concurrency, isolation, durability
- operational data store
- oltp
- olap/holap/rolap
- data mart
- data warehouse
- star schema
- fact
- dimension

general

- what is a database
- data model vs implementation

normalization

- why normalize
- the normal forms
- the update anomalies
- BCNF normalization procedure

E/R diagrams

- be able to draw one the way we learned in class
- and their relationship to the formal relational model

transactions

- journal first, then commit row changes
- system recovery procedure
- two-phase commit

concurrency (locking)

- the 3 concurrency problems
- the different types of locks
- deadlock procedures

database types

- operational data stores/OLTP vs data marts/data warehouses/OLAP
- design considerations in decision support databases
- star schema/dimensional schema/snowflake
- schema
- multidimensional databases

distributed databases

- the 12 objectives
- the problems

database security

IS306: Networking (1)

definitions

telecommunications
qualities of networks
OSI network model
types of data
types of media
baud rate
bit interval
ASK
FSK
PSK
QAM
codec
channel capacity vs. analog bandwidth
shannon's theorem
pulse code modulation
analog signal
digital signal
error detection
error control
flow control
multiplexing
DS-1, DS-2, etc.: channels, bandwidth, bandwidth/
channel
T-1, T-2, etc.: nearly, but not the same as DS-1 --
different channel allocation
SONET: Synchronous optical network
switched network
circuit switching
packet switching
POTS
PTSN
PBX
local loop
trunk
SS7
SIP
leased line
WAN
LAN

MAN
BAN
PAN
repeater
hub
bridge
switch
router
autonomous system
Cell relay
CSMA/CD
elastic traffic
inelastic traffic
H.323
RTP
FDMA
TDMA
CDMA
PCS
WEP
WPA
802.1x
DES
3DES
AES
Web 2.0
fixed-mobile convergence

changes in communications

why people care about communications
allows wider geog. dispersion of business units
trim down middle management
allow easier communication among org. depts
and workers and management
forces that drive communications
traffic growth
development of new services
advancement of technology
forces that drive telecom change

global regulation and deregulation
emerging technologies and convergence
mergers and acquisitions
communication tech. trends
faster cheaper tech
increasingly intelligent networks
the internet
mobility
network convergence
Topics
web 2.0
fixed-mobile convergence
quad play

transmission & transmission systems

modulation: ASK, FSK, PSK, QAM
transmission interfaces: A-A, A-D, D-A, D-D
sync vs. async
NRZ-L & problems with it
NRZ-I
Manchester code
shannon's theorem
difference between an analog and digital
communication system
advantages & disadvantages of both

data link control

flow control
error detection and control
multiplexing: TDM vs FDM vs WDM
synchronous TDM vs async (statistical) TDM
how ADSL works
discrete multitone FDM
DS-1, DS-2
T-1, T-2
SONET

circuit switched network

phases of connection
advantages/disadvantages vs. packet switched

IS306: Networking (2)

how the PTSN works
signaling in circuit switched networks
SS7
Softswitch

WANs

enterprise view considerations
types of WANs

packet switched network

advantages/disadvantages vs. circuit switched
datagram vs. virtual circuit approach
public switched network offerings
types of leased lines
switched network hardware: repeater, hub, bridge, switch, router
layer 2 switch vs layer 3 switch
how OSPF works
how BGP works
OSPF vs. BGP
X.25
Frame relay and how it works
Frame relay vs. X.25
ATM and how it works
ATM vs. frame relay vs. X.25
IEEE 802 reference model
how ethernet works, esp. collision detection
Fibre channel
Fibre channel modes
Fibre channel vs. iSCSI
What is a SAN
Why do we care about SANs

internet and TCP/IP

TCP/IP stack
TCP/IP stack compared with OSI model
advantages of internet (vs what?)
Problems of internet
Proliferation of Applications (Videoconferencing, voice over IP)

Increased access speeds creating congestion at the core
Paradigm shift as voice and data traffic converge
Unpredictable delays for real time delays
Inadequate support for QoS
Insufficient reliability, low availability and high cost
future uses and challenges of internet
End-to-End QoS using inter domain mechanisms
Service Creation Platforms
Network Appliances and their networking
Full motion video capturing
All optical IP networking and broadband access
New applications (Internet 2)
Data and IP applications over wireless.
M-Commerce
Virtual collaboration
Security is a big challenge.
forces driving the internet
internet addressing: class A, class B, class C
subnetting
DNS
IP
TCP
UDP
QoS: Integrated services (intserv) vs differentiated services (diffserv)

Voice over IP

how does it work: signaling and transmission
advantages vs. circuit switched
technical issues, organizational issues
SIP
H.323
RTP: real time transport protocol

cellular communication/Wireless WAN

what is cellular?
1G, 2G, 3G
4G: what's coming next

FDMA, TDMA, CDMA
PCS
Issues re: designing UI for mobile devices
WiMax
802.11n
satellite communication

wireless LAN

Why do we care about wireless LANs?
technologies: IR, radio, spread spectrum
Wifi: 801.11(abgn)
WEP
WPA, WPA2
802.1x
Bluetooth

Security

security requirements
authenticity
integrity
confidentiality
availability
security attacks
passive: release of message contents
passive: traffic analysis
active: masquerade
active: replay
active: modification of messages
active: DOS
symmetric encryption and its attacks
attack: cryptanalysis
attack: brute-force
sym: link-to-link vs. end-to-end channel encryption
sym: key distribution
message authentication and hash functions
message auth: with sym. encryption
message auth: without sym. encryption
public key encryption
VPN and IPSec
transport mode (end stations)
tunnel mode (gateways only)

definitions

- software life cycle
- software BOK
- software
- software methodology
- use case
- timebox
- Shu Ha Ri
- ba
- user story
- spike development
- project velocity
- agilism
- CMMI
- iterative development
- incremental development
- object orientation

software in general

- brooks' essential qualities of software
- brooks' accidental qualities of software
- why the essential qualities are more important
- common failure rate of software projects
- what is object orientation and why do we care about it?

software methodologies

- my software project success measure
- Curtis 1998: layered behavioral model, 3 process
- issues: thin spread of app. knowledge, changing or conflicting requirements, comm. and coordination
- breakdowns
- Cockburn's characteristics of methodologies
- code and fix

waterfall

- philosophy and overview
- history in military projects
- the phases and their deliverables
- pros and cons
- when is it appropriate
- when is it inappropriate
- Jared Spool, Krug UI design (iterative)

RUP/UP

- overview
- what RUP does not address
- RUP building blocks
- phases
- disciplines
- work products
- use cases
- timeboxing
- benefits
- criticisms from the agilists

agilism

- overview
- what agilism does not address
- agile vs. non-agile: pros and cons
- RUP vs. agilism
- Shu Ha Ri: following detaching fluent
- agile manifesto bits
- humans are individuals
- strengths and weaknesses of humans and how agile methodologies try to address them
 - people make mistakes
 - people are risk averse
 - not made here syndrome
 - people are inconsistent
 - people are creatures of habit
- knowledge sharing, creativity and collaboration
- Nonaka and ba
- Agilism and documentation
- when it works best (caveats)

- criticisms: general deep expertise, knowledge transfer, staffing and cultural issues
- agile modeling
- XP: overview and phases

rating software organizations

- CMM/CMMI phases

definitions

logical positivism
analytic-synthetic distinction
verifiability theory of meaning
observational vs. theoretical language
inductive logic
sensationalism
Quine holism
external world skepticism
inductive skepticism
holistic empiricist theory of meaning
explanatory inference (KT boundary)
natural kind
one-process science
two-process science
Kuhnian incommensurability
Kuhn paradigm
paradigm
paradigm variation
theory-ladenness of observation
relativism
no privileged methodological viewpoint (science is not privileged)
no way of evaluating viewpoints
emphasize seeing things from the point of view of participants
qualitative methods
working hypotheses rather than theories
research-then-theory
constructivism
naturalism
critical realism: Robson
scientific realism: Godfrey-Smith
covering law theory of explanation
unification (causation not the only explanatory schema)
law
hypothesis
intersubjectivity
empirical generalization

axiom
proposition
causal process
concept types
primitive concept
derived concept
abstract concept
concrete concept
theoretical concept
operational definition
statement types
existence statement
relational statement
theory
nominal quantization
ordinal quantization
interval quantization
ratio quantization
fixed research design
internal validity
research question
regression to the mean
pre-test
post-test
fixed research
flexible research
design research
action research
kernel theory
IT artifact
TAM
structuration theory
unit of analysis

philosophy of science: general

3 characteristics of science
themes that run throughout philosophy of science
what do we use scientific knowledge for: Reynolds
what do we use scientific knowledge for: Robson
what is real world enquiry: Robson

characteristics of social research: Robson
embeddedness
open and closed systems
non-replicability
ethical issues

philosophy of science: the old days

sensationalism
problem with sensationalism
positivism
logical positivism
Quine holism vs. logical positivism
Logical empiricism
Robson positivism and criticisms of positivism in social science
The ravens problem: inductive skepticism
Popper: darwinian evolution, falsification theory of meaning
grue problem
problems with Popper

philosophy of science: the 60s and 70s

Kuhnian revolutions
Kuhnian process
Kuhnian incommensurability
Lakatos: research programs
Laudan: research traditions
Feyerabend: anything goes, the big idea
Sociology of science
Merton
strong program
Latour, laboratory life
Feminism and science studies
Relativism
Robson relativism
constructivism

philosophy of science: naturalism

naturalism vs. foundationalism

this is the relationship of philosophy to science
and vice versa
theory-ladenness of observation
three ways that theory affects observation
guides where to look
guides which observations to choose
results must be put into words

Naturalism

Hull

Kirchner (division of labor)

Stevens (extends Kirchner)

Scientific realism

Robson critical realism

Baysianism

forming and using theories:

3 desirable characteristics of scientific knowledge

abstraction

intersubjectivity

empirical relevance

what kind of theory: Kuhn paradigm, paradigm,
paradigm variation

do we need theory to do research? (Robson)

concepts

primitive vs. derived

abstract vs. concrete

theoretical concepts vs. operational definitions

my diagram which relates all those concepts

quantification: nominal, ordinal, interval, ratio

statements

existence and relational

deterministic and probabilistic

law, empirical generalization, hypothesis,

proposition

what is a bad theory

what is a good theory

set of laws: what is this, pros and cons, examples

Czikszenmihalyi: where do hypotheses come from

axiomatic theory: what is this, pros and cons,

examples

causal theory: what is this, pros and cons, examples
axiomatic-causal theories
simulation

should the hypothesis be presented before the
data are examined?

relationship of statements to data: the buckets
filling up with data model

the practice of research

what is good social science research?

what are characteristics of bad social science

research

where does the initial idea come from

developing your ideas

research-then-theory

theory-then-research

composite approach

characteristics of a good research question: Robson

Robson's research question framework

the practice of research: fixed research

what is it

when should you use it

when should you not use it

internal validity issues

external validity issues

objectivity, credibility, biases

experimental strategy

true experiments

performing true experiments outside the lab
(Robson)

randomized controlled trial (RCT)

post-test only RCT

post-test only two treatment comparison

pre-test/post-test only RCT

pre-test/post-test only two treatment

comparison

three or more groups

factorial design

parametric design

matched pairs

repeated measures design

quasi-experiments: pre-experimental

what are they, when are they indicated, how do
they differ from the others

pre-experimental: single group post test only

pre-experimental: post-test only non-equivalent
groups

pre-experimental: pre-test/post-test single
group

pre-test/post-test non-equivalent groups

interrupted time series

regression-discontinuity design

single case designs

non-experimental designs

what are they, when are they indicated, how do
they differ from the others

relational: cross-sectional studies

relational: prediction studies

comparative designs

longitudinal designs

the practice of research: flexible design

what is it, and when is it indicated

evolving design

researcher as instrument

presentation of multiple realities

focus on participant viewpoints

characteristics of good flexible design

researcher qualities for flexible design

validity problems and counters

generalizability issues

case studies

ethnographic studies

grounded theory

phenomenological studies

hermeneutics

the practice of research: design research

what is design research

IS360: Research (3)

- when is it indicated
- when is it not indicated
- types of IT artifacts
- Hevner's seven characteristics
- design science vs. behavioral science
- design science vs. practice

the practice of research: action research

- what is action research
- when is it indicated
- when is it not indicated
- evaluation research
 - what is it
 - Robson's how to carry it out
 - formative evaluation
 - summative evaluation
- action research
 - what is it
 - Robson's action research cycle
 - Robson's assumptions for those wanting to do action research

IS research

- Benbasat and Zmud
 - their problem statement
 - the nomological net
 - errors of inclusion
 - errors of exclusion
- kernel theory
- rigor-relevance dilemma

IS360 papers:

- Webster and Watson: reviews
- Dube and Pare: positivist case research
- Speier and Moris: command line vs UI
- Albert et. al.: GIST, nanosegments, nanoflows
- Pawlowski and Robey: knowledge brokering by IT people
- Bock, Zmud, et. al.: knowledge sharing intention
- Premkumar and Bhattacharjee: merged TAM and expectation-discontinuity theory of tech. usage

- Gaullagher and Wang: web server/client network effects
- Kohli and Kettinger: informing the clan
- Walsham: structuration and cross-cultural software production and use
- Swanson and Ramiller: mindful innovation

IS Theories

- media richness theory
- theory of planned behavior/reasoned action
- speech act theory
- structuration theory
- adaptive structuration theory
- systems theory
- medium theory
- absorptive capacity
- agency theory
- socio-technical theory
- TAM
- garbage can theory
- contingency theory
- cognitive fit theory
- cognitive load theory

Make a plan

- There are really five subjects. Count IS328/29 as one big subject.
- Look at your calendar and divide up the time remaining among the five subjects.
- Allocate 2-3 weeks at the end for review and practice.
- Allocate more time to subjects you are less sure of, and to bigger subjects.
- Start studying the subjects you are most sure of first.

Gather materials

- Screening exam questions from previous years.
- Peoples' notes from previous years.
- Syllabi from the most recent instances of each course
- Slides.
- Books. These may have changed since you took the course!
- Papers. These may have changed also!

Understand how you study

- Know what kind of learner you are and be sure to study in the way you are most comfortable.
- Dedicate enough time to study each week.
 - Only you know how much you need.
 - This will probably be between a few hours every day to a few hours a few times a week.
- **Important! Factor in enough downtime.**

Join a study group ...

Group studying: pros

- Good for helping with your understanding of topics, sanity checking.
- Good for generating sample questions and helping you evaluate your answers.
- Good for motivation and mutual support.
- Good for getting other people's notes.
- Good for trying to prioritize topic areas.
- Still do your own studying for all subjects. This is not the time for division of labor.
- Rita may be able to help you find a group.

... or don't.

Group studying: cons

- Meeting with group, arranging meetings takes time away from actually studying.
- May not work for you if you live far away from your group mates, if you work, if you have family concerns, etc.
- Group may not want to study in the same order that you do.
- Could be bad for motivation, frustrating.
- You may just study better alone.

First pass: detailed notes

- You're going to be studying for months, and you'll want to be able to review.
- Go through all the books, papers, slides, other people's notes thoroughly.
- Summarize all the major topics.
- Ensure that you understand all those topics.
- Do more research on anything that isn't fleshed out enough or that you don't understand.
- Go through **all classes** at first pass.
- **The value is in making the notes.**

What is normalization and why is it important?

Normalization is about eliminating redundant data from tables in order to avoid "update anomalies," and consists of finding and extracting sets of columns that form functional dependencies within a table. The process of normalization is that of decomposition of one table into more than one independent table (called "projections" of the first; independent because to act on rows in the table, I don't have to reference another table) in a reversible and information-preserving way. Each projection consists of a primary key and columns irreducibly and non-transitively dependent on the primary key (BCNF)? The original table can be regained by joining the projections.

Date, p. 335 (functional dependencies), p. 350

transitivity: If $A \rightarrow B$ and $B \rightarrow C$, then $A \rightarrow C$

irreducibly dependent: in $A \rightarrow B$ on R , B is irreducibly dependent on A if there is no determinant $A' \subset A$ such that $A' \rightarrow B$ on R

candidate key: a subset K of columns in R that is a key and is not a proper subset of any other key. If a relation has more than one candidate key, we designate one as the **primary key** and the others as **alternate keys** (p. 271)

Normal forms


A table is in **4NF** has to do with multi-valued dependencies

Date, pp. 358, 361, 363, 367.

I think that what I have gotten stuck on is the difference between 1NF and 2NF, and that I get stuck on the difference between 2NF and 1NF. I always add that auto-incrementing id column as a primary key in your relation, you automatically ensure that it is dependent on the primary key. So my normalization is 4NF.

A table is in **BCNF** (Boyce-Codd normal form) iff every determinant (the left side of an FD) is a candidate key (p. 367). If a relation has only one candidate key, the BCNF form == the 3NF form. A table in which every column is part of the primary key is automatically in BCNF. 3NF doesn't deal with the case where there is more than one candidate key, each key is composite, and the columns in the keys overlap. The combination of these three conditions may not occur often in practice (p. 367).

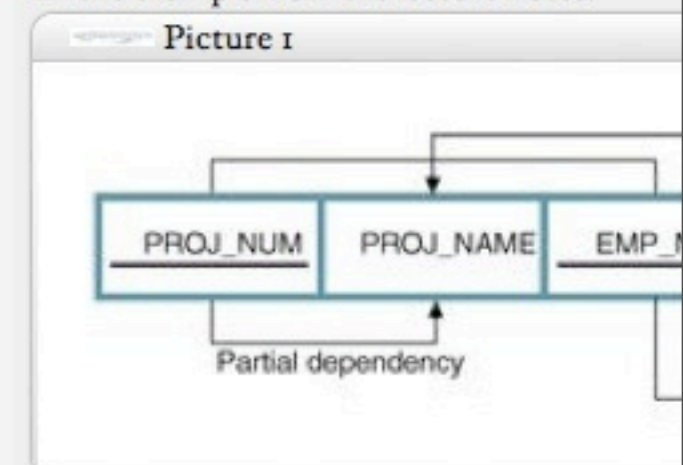
Lecture notes from Chap 12.

 Chapter12

A table is in **3NF** iff for all time it consists of a primary key (unique, not null) that identifies some entity plus a set of zero or more mutually independent attributes which are irreducibly and non-transitively dependent on the primary key that describe that entity in some way [Date, p. 358, 363]. So, it's in 2NF but the non-key attributes are also mutually independent and non-transitively dependent on the primary key. Non-transitive implies mutually independent.

The lecture notes from Chap 12 seem to have a different definition of 1NF there says "all attributes must be dependent on the primary key" the text in Date, p. 358 implies that 1NF table must have a primary key. Date p. 357 that "assume for simplicity that each relation has a primary key." The lecture notes assume is the primary key."

In the example from the lecture notes:



the primary key is (PROJ_NUM, EMP_NUM) (and other dependencies) PROJ_NAME is only dependent on PROJ_NUM

Update anomalies in 1NF

INSERT: we can't record the fact that a supplier is in a certain city without having a shipment to record.

Date, pp. 359-360

How do you say this without referencing a column that is not a primary key?

DELETE: if we delete the last shipment for a supplier, we lose the info about the supplier

There are also anomalies in 2NF (p. 362), near 3NF

You're trying for synthesis level understanding

- Build cognitive maps
- Build the big picture in your mind
- Try to see the same concepts many times from many perspectives
- See how everything interrelates
 - Software development and management
 - Benbesat and Zmud and the role of ERP systems in organizations
 - etc.
- Do this because this is what you'll be asked to do on your exam

economic, societal, political and regulatory environment

THE FIRM

INDUSTRY

STRATEGY

| | | | | |
|---|---|--|--|---|
| business state struggling competing breaking away | business orientation synergistic agile autonomous | business intent operational excellence customer intimacy product service leadership & innovation | operating model differentiated cooperative unified replicated | strategic position market/channel product/service value chain boundary |
|---|---|--|--|---|

| |
|-------------------|
| competitors |
| new entrants |
| consumers/markets |
| substitutes |

BUS ORG

business governance business maxims

| | | | |
|---|------------------------------------|--------------------------------|---|
| organizational model hierarchy hybrid entrepreneurial project matrix on-demand | corporate business units | org learning and change | business operations, initiatives and projects alignment |
|---|------------------------------------|--------------------------------|---|

extended enterprise

| |
|-----------------------|
| outsourcing |
| partners |
| supply chain |
| consortia (ecosystem) |

IT ORG

enterprise architecture

| | | | |
|---|--------------------------------|------------------------|---|
| CIO | IT governance | IT maxims | IT operations, initiatives and projects |
| organizational model hierarchy hybrid entrepreneurial project matrix on-demand | org learning and change | Financial transparency | process based teams |

relationship mgmt

| |
|-------------|
| outsourcing |
|-------------|

| | | |
|-------------|---------------------------|-------------|
| methodology | strategic/tactical models | future tech |
|-------------|---------------------------|-------------|

IS RESEARCH

BUSINESS

IT

Things you can (probably) ignore

- Robson, Part III (Tactics) and Part IV (Dealing with the Data)
- Most of UML. Keep domain diagrams, use case diagrams, system diagrams
- Details of IT Project Management
- Hardcore SQL, HTML, PHP, etc.
- Network protocol details
- Odd network protocols: HDLC, FibreChannel, Bluetooth
- The Applegate case studies

What to Look out for



- ❑ **Conferences that faculty attend/organize**
- ❑ **Projects that they work on**
- ❑ **Changes in the school**
- ❑ **IS community as a whole**
- ❑ **Read journals (last one year at least)**
 - ❑ **MISQ**
 - ❑ **JMIS**
 - ❑ **ISR**
 - ❑ **Make some notes e.g. Hevner (2004) in MISQ argues that....**

What to Look out for



- ❑ Conferences that faculty attend or organize
 - ❑ Projects that they work on
 - ❑ Changes in the school
 - ❑ IS community as a whole
 - ❑ Read journals (last one year at least)
 - ❑ MISQ
 - ❑ JMIS
 - ❑ ISJ
- Make some notes e.g. Hevner (2004) in MISQ argues that....

Extra work: IT trends

- Some past questions have been about current and future industry trends.
- IS306 (look at internet, telephony, convergence trends, etc.) and IS328/329 (outsourcing, technology, strategy) are most likely candidates.
- Examples: cloud computing, open source, Web 2.0/3.0, quad-play.
- Look at *CIO Magazine*, *Computerworld*, others.

Extra work: IS theories

- Theory of planned behavior
- Media richness theory
- Adaptive structuration theory
- Garbage can theory
- Contingency theory
- etc.
- Knowing a set of the popular ones will help you support your arguments

See:

<http://www.cw.utwente.nl/theorieenoverzicht/Theory%20clusters/>

<http://www.istheory.yorku.ca/>

Second pass: topic review

- After the first pass through all the courses, it's two to three weeks before the exam.
- Go through all your notes from the first pass.
 - Possibly try to estimate what **won't** be on the test.
 - Ensure that you still understand everything.
 - Be able to remember all the details for every topic without looking at your notes.

IS306: Networking (1)

definitions

telecommunications
qualities of networks
OSI network model
types of data
types of media
baud rate
bit interval
ASK
FSK
PSK
QAM
codec
channel capacity vs. analog bandwidth
shannon's theorem
pulse code modulation
analog signal
digital signal
error detection
error control
flow control
multiplexing
DS-1, DS-2, etc.: channels, bandwidth, bandwidth/
channel
T-1, T-2, etc.: nearly, but not the same as DS-1 --
different channel allocation
SONET: Synchronous optical network
switched network
circuit switching
packet switching
POTS
PTSN
PBX
local loop
trunk
SS7
SIP
leased line
WAN
LAN

MAN
BAN
PAN
repeater
hub
bridge
switch
router
autonomous system
Cell relay
CSMA/CD
elastic traffic
inelastic traffic
H.323
RTP
FDMA
TDMA
CDMA
PCS
WEP
WPA
802.1x
DES
3DES
AES
Web 2.0
fixed-mobile convergence

changes in communications

why people care about communications
allows wider geog. dispersion of business units
trim down middle management
allow easier communication among org. depts
and workers and management
forces that drive communications
traffic growth
development of new services
advancement of technology
forces that drive telecom change

global regulation and deregulation
emerging technologies and convergence
mergers and acquisitions
communication tech. trends
faster cheaper tech
increasingly intelligent networks
the internet
mobility
network convergence
Topics
web 2.0
fixed-mobile convergence
quad play

transmission & transmission systems

modulation: ASK, FSK, PSK, QAM
transmission interfaces: A-A, A-D, D-A, D-D
sync vs. async
NRZ-L & problems with it
NRZ-I
Manchester code
shannon's theorem
difference between an analog and digital
communication system
advantages & disadvantages of both

data link control

flow control
error detection and control
multiplexing: TDM vs FDM vs WDM
synchronous TDM vs async (statistical) TDM
how ADSL works
discrete multitone FDM
DS-1, DS-2
T-1, T-2
SONET

circuit switched network

phases of connection
advantages/disadvantages vs. packet switched

Third pass: practice

- You need to be able to write effectively under pressure and with a time limit.
- Make up sample questions of your own using the existing screening exam questions as a model.
- Write out the answers to those questions in Word, **give yourself a 1 hr time limit.**
- Evaluate your essay. How well did you do? Possibly give your essay to someone else to evaluate.

Question genres

Probably one big question with many sub-parts on different things. One year had 2 questions, each with sub-parts.

Describe a particular research tradition

describe the methodology, when are they indicated/counter-indicated, validity concerns, necessary research qualities, examples. Is it appropriate/inappropriate for IS? characteristics of social research: good research and bad research
design research
action research
fixed
flexible
how do you evaluate the results of each kind of research

Compare research traditions

fixed vs. flexible
social science (fixed/flexible) vs. design
social science (fixed/flexible) vs. action
when would you use each of the different kinds of research: fixed, flexible, action

What is theory

what is a concept
what is a statement
how do empirical data relate to theory
set-of-laws vs. axiomatic vs. causal process
what is a good theory/what is a bad theory
how can theories be developed
how can they be tested
how can one say that a theory is (tentatively) true?

Something about IS research in particular

Benbasat and Zmud
kernel theory

Something about research in practice

what is good social science research/bad research
research-then-theory, theory-then-research, combination
characteristics of a good research question: Robson

Given a research question, describe what methodology you would use and why

Philosophy of science

what does scientific knowledge do for us
characteristics of scientific knowledge
what are the qualities of science
describe a particular tradition, e.g. logical positivism
compare traditions: relativism vs. skeptical realism
how does science progress, work: Popper, Kuhn, Merton, Hull, Kirchner

Sample Questions

Describe design science: what is it, how do you do it, what is good action science, and how do you evaluate it relative to other traditions. Compare to social science research.

Describe action science: what is it, how do you do it, what is good action science, and how do you evaluate it relative to other traditions. Compare to social science research.

Describe **fixed** and **flexible** research: what they are, what is good research of this kind, what is bad research of this kind. What validity issues should we be watching for in our fixed and flexible designs?

What is the the rigor-relevance dilimma?

Over the past five or so years, much thought has been given to establishing boundaries on IS research. Why is this important? What is current thinking on the nature of IS research?

What is the role of positivism in IS today? What is positivism as used by IS today, and how does that relate to logical positivism. Why is positivism controversial among IS scientists?

What are the characteristics of science and scientific knowledge? What do we use scientific knowledge for. How does scientific knowledge change through time? What are the social qualities of science?

What is theory, how do we test theory, how do we prove (tentatively) that a theory is true, what are the different kinds of theory: compare and contrast the various styles of theories.

**Make regular backups of your notes
and materials!**

Contingencies: When the Organic Matter Hits the Fan

- ❑ **Murphy's Laws**

- ❑ **Health & family issues**

- ❑ **Bad things may happen to good people**

- ❑ **Listen to what your body tells you**

- ❑ **The Chocolate and Nuts Diet**

- ❑ **It helps to have a good support group**

- ❑ **Getting cold feet**

- ❑ **DON'T!!!**

- ❑ **It may seem like EVERYTHING, but it really isn't**

- ❑ **it's simply a *rite of passage*, that's all**

- ❑ **And, if nothing else...there's always another chance**



Answering the questions

The Basics

- Assume one hour per question. 45 minutes if you are feeling confident.
- Start with the questions that you know best. Don't panic.
- Be accurate, fast and brief yet sufficient.
- End with the one(s) you are the least confident with.
- If you draw a blank, write down anything that comes to mind. Often the act of writing will trigger ideas, leading to legitimate answers
- Watch the clock carefully.
- Save your work constantly!!

Writing the Exam



- Manage your time well!!!**
- FOLLOW THE INSTRUCTIONS EXACTLY**
- Don't forget to configure "Auto-Save" in MS Word (Tools -> Options -> General -> File Options tab)**
- If your computer crashes**
 - Don't panic**
 - Restore from backup**
 - Save to alternate file if need be: inform the proctor about any issues and/or difficulties you may have encountered: it's okay, they know you are using a computer...**
- Keep your eyes on the clock**



The Questions

- There are more than six questions: each question will have sub parts, sometimes *many* subparts.
- Three genres of questions:
 - Define something
 - Design something
 - Argue something

Definition questions

- What is X ?
- There will be many of these: 20+
- Answer with just a few sentences
- This is the kind of question for which you'll want to have the answer immediately available. This is about *breadth*.

Design questions

- These are generic, and it's up to you to make up the details. Don't kill yourself by choosing an ill defined problem. These can be time traps.
- Describe your problem domain carefully
- Detail any appropriate business rules and constraints
- Define some clear goals that the users of the system want to accomplish
- Use all that to supply what the question asks for: diagrams, procedures, methodology walkthroughs ...
- Stop writing and move on.

Argument based questions

- Evaluations, compare/contrast, how does X affect Y, scenario questions, etc. This is about *depth*.
- Start by restating the question.
- State your thesis. One sentence.
- Foreshadow the evidence that's coming.
- Define your terms: show your work
- Give your evidence clearly. Give warrants if necessary.
- Write a conclusion that summarizes your argument.
- ~~Suggest avenues for future research.~~
- Stop writing and move on.

Analytical toolkits

Make up formal toolkits of models and ideas that you can use help understand questions and also use to support your arguments.

IS328/329 Toolkit

- The value of IT
- Porter's five forces model of competition in a market
- Porter's value chain analysis model
- McFarlan's strategic grid model
- Enterprise architecture
- SWOT (Strengths, weaknesses, opportunities and threats)
- Henderson and Venkatraman's strategic alignment model

IS360 Toolkit

- Action science research
- Design science research; Hevner 2004, esp.
- Fixed and flexible research
- Popular IS theories
- Benbasat and Zmud
- Positivism vs. relativism vs. realism
- Rigor/relevance dilemma

Leading up to the exam

Morale is everything

- Try to stop studying a few days early
- Possibly stay in Claremont the night before your exam
- Don't study the night before your exam: relax, watch a movie
- Go to bed early, get a good night's sleep
- Be confident and know that you can do it

The day of the exam

- You know what you know at this point, now just do your best
- Eat a healthy breakfast
- Get to the test room early
- Don't let others degrade your confidence; resist comparisons
- Bring drinks, snacks; stay hydrated and fed
- Sit so that you can't see anyone else
- Bring earplugs
- Bring sweater

Jan 2009 Questions

Morning

SCR1: Databases (IS302)

SCR2: Systems (IS305)

SCR3: Networking (IS306)

This is a historically typical distribution.
Knowing this does not help you.

SCR I: Databases (IS302)

Design a database for a travel agency. Detail any assumptions that you make.

(a) Draw the E/R diagram, and describe the subsequent relational tables.

(b) Describe a stored procedure that you would use, in pseudo code if necessary, and say why it might be needed.

SCR2: Systems (IS305)

In the CGU information systems curriculum, two key concepts are object orientation and agile. What are they? In what ways are they compatible with each other? In what ways are they incompatible? How do they interact with important aspects of traditional project management such as scheduling, budgeting, oversight? What kinds of projects are they best suited for? What kinds are they not as well suited for?

SCR3: Networking (IS306)

(a) What do we mean when we say: analog data, analog signaling, analog transmission? What do we mean when we say: digital data, digital signaling, digital transmission?

(b) Why is packet switching important? Trace a packet through a packet switched network. How do these things occur: lost packet, duplicate packet, out-of-order packets? Do packet switched networks have greater end-to-end transmission delay than circuit switched networks? Why?

(c) What is Web 2.0? Name three technologies that have contributed to the rise of Web 2.0. Name a current Web 2.0 site, and tell what its impact has been.

SCR3: Networking (IS306)

(a) What do we mean when we say: analog data, analog signaling, analog transmission? What do we mean when we say: digital data, digital signaling, digital transmission?

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(b) Why is packet switching important? Trace a packet through a packet switched network. How do these things occur: lost packet, duplicate packet, out-of-order packets? Do packet switched networks have greater end-to-end transmission delay than circuit switched networks? Why?

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(c) What is Web 2.0? Name three technologies that have contributed to the rise of Web 2.0. Name a current Web 2.0 site, and tell what its impact has been.

7

19

$60/19 \approx 2$ min/question

Afternoon

SCR4: Policy (IS329)

SCR5: Mgmt of IT (IS328)

SCR6: IS Research (IS360)

This is a historically typical distribution.
Knowing this does not help you.

SCR4: Policy (IS329)

I don't remember the lead in for this one, but it was essentially: this question is about inter-organizational governance, for when a group of companies combine to deliver an IT service.

(a) What are some research concepts and principles that could help to understand the issues surrounding governance of a multi-firm chain delivering an IT service to end users?

(b) Now looking at practice, what would your priorities be in setting up effective inter-organizational IT governance? (a) what are some of the things you would be looking at (including but not limited to IT architecture) and (b) what metrics would you use to assess success?

SCR5: Management of IT (IS328)

Again I don't remember the lead in on this one, but it was about how IT affects business strategy:

- (a) In what ways can IT affect business strategy?
- (b) How do systems provisioning choices (build in house, use contractors, use off-the-shelf systems, etc.) affect strategy?
- (c) How do service provisioning choices (near outsourcing, offshoring, in-house, etc.) affect strategy?
- (d) What other important factors affect how effective IT choices are in affecting strategy?

SCR6: IS Research (IS360)

Put your philosophy "hat" on.

(a) How would an empiricist view design science?

(b) How would a naturalist view design science?

(c) How would a scientific realist view design science?

My gifts to you

These slides and all my notes:

<http://visual.placodermi.org/>

My many blog posts about my own experience:

http://visual.placodermi.org/tag/screening_exam/

Good luck!