

How to Interview a System Administrator

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A Note to The Reader

What you see before you are my speaking notes. I don't intend to project anything during the class and I can't see much use in writing a separate set of notes for your booklet. I also think you'd rather have my complete notes than have to be scribbling much of the time I'm talking. As such these speaking notes may not flow as smoothly as you might expect of material in a booklet or as that intended for projection during the class – but I hope you'll forgive me that in exchange for my having provided you with more complete information.

Administrivia

- Schedule
- Notes/CD
- Web site
- Evaluation forms

Overview

- Goals of course
- Audience
- Purpose of interview
- Interview Basics
- Questions
- After the Interview

Goals

- Improve skills as an interviewer
- Improve skills as a candidate
- Help you/your company avoid a lawsuit
- Maybe learn some technical stuff
 - Answers to all sample questions are available

Audience

- Senior sysadmins, interviewing more junior admins
- Mid-level sysadmin, interviewing up or down
- Managers
- Junior sysadmins, interviewing peers/more experienced folks

What Is the Purpose of an Interview?

- Assess the skills of the candidate
 - Learn, don't challenge; "teaser" for good/bad questions
- Inform the candidate of the job duties
 - Ask candidate if s/he has questions

(more purpose)

- Determine whether the candidate is a good “fit” for the group
 - Personality, work style, work hours, personal requirements, etc.
- Help the candidate figure out if the group is a good fit for him/her
 - (talk about fit, and “teaser” for prohibited questions)

**DID YOU
HEAR
THAT?**

A two-way process!

- You learn about/from the candidate
- The candidate learns about/from you

Not a contest!

- The goal is for everyone to win
 - Don't play “stump the chump”

No need to prove how much you know

- You already have a job!
- What matters is whether the candidate knows enough to meet the job requirements
 - NOT if s/he knows as much as you!

Interview Basics

No HR

- This is just the tech stuff
- Some of it is affected/modified by/controlled by HR
- Work with your HR folks
 - But don't let them get in the way

Before the interview

- Make sure the candidate knows date/time, location/directions, who to ask for, parking arrangements, etc.
 - If possible, who s/he will meet (with titles)
- Dress code
 - “Not going to tell you what to wear, but just FYI, most folks here wear blah”

(more before)

- Interview format
 - One-on-one, group, pairs, etc.
- If appropriate, arrangements for lunch

Group Interviews

- Pros:
 - Lets all members of group hear answers
 - Lets each person cover their pet aspect of a general question
 - Can save time

(more group)

- Cons:
 - Can be intimidating
 - Harder to not go down rat holes
 - Harder to schedule for the group

(boss + sr. techie)

- An alternative is the boss and the senior techie together
 - Lets boss hear answers to technical questions
 - And follow-up with higher-level questions like “what was your recovery plan” or “how did you deal with the management issues of that change”

(back to “before”)

- Read the damned resume!
 - And take a copy with you!

At the beginning
of the interview

First interviewer

- Meet candidate on time
 - Or be waiting for call from the front desk
 - Via cell phone if necessary
- Give candidate printed schedule

Every interviewer (including first)

- Introduce self
- And give card!
- Ask candidate about drink, bio break, etc.
- **TURN OFF YOUR CELL PHONE!**
 - If you're on call, get someone to cover for you

(more every interviewer)

- Tell candidate what you plan to discuss
 - “I’d like to start by asking you a few questions, then I’ll give you a chance to ask me whatever you want to know.”
 - “Do you have any questions before we get started?”
 - Candidate might/should ask about boss; be honest but “gentle”

**Make the candidate
comfortable!**

Interviews are stressful

- Candidates will have a hard enough time answering questions, don't make it harder
 - Or you won't get an accurate picture

(more stress)

- Make candidate understand you're trying to learn what/how much they know
 - Saying "I don't know" or "I've never learned that" is OK
 - Better to say that than guess

Order of interviewers

- Start with boss
 - Spend a lot of time telling candidate about the job
 - Requirements
 - Skills needed
 - Current projects, future projects
 - Boss' "vision"
 - Specific needs of the group

(more order)

- Concentrate on management issues
 - What does candidate want/need from manager
 - “Employee style” (opposite of manager/management style)
 - Personal requirements (hours, days off, etc.)
- Let techies (especially the most senior) worry about candidate’s technical skills
 - Unless interviewing for the most senior position
 - In which case get help from other groups and/or outside
 - (instructor is available on a consulting basis :-)

Boss follow-up

- If long interview and/or time permits, have candidate meet boss a second time at the end
 - Chance to ask questions
 - Or get clarifications
 - Tell candidate what will happen next
 - Reference/background checks
 - And when it will happen

(more follow-up)

- Give candidate date to call back if no reply
- And who to call
- Tell candidate who to contact (and how) if additional questions

Grand-boss?

- If appropriate, have candidate meet grand-boss
 - Or manager's peers
- Should focus on telling candidate about the company in general
- But maybe also something about what grand-boss needs from group to help other groups

Who interviews the candidate?

- Boss
- Boss' peers?
- Peers/group members
- Peers in other groups?
- Customers in other groups
- Grand-boss?

Other Basics

- Be on time!
 - Boss probably wants 2x time of group members
 - At least 1.5x
- Senior also wants 2x
 - Maybe more, but rarely less

(more other basics)

- Your responsibility as interviewer to tell boss/HR how much time you want
 - Probably don't get much choice as peer
 - Senior ought to have some say
 - If not enough time, ask to do phone screen/"tech-out"
 - Before the face-to-face!

Still More Basics

- If candidate stays in room, get schedule then go there at assigned time!
- If candidate moves, know where previous interviewer is
 - Go get them if late

(more still more basics)

- Schedule 5 minute break half-way through
- Schedule lunch break if appropriate

Interviews and Lunch

- Keep them casual
- Should be a break from tech. questions
- Make sure candidate gets time to listen (and thus eat)
- Good time to discuss non-work stuff

(more interviews & lunch)

- Also, sell the company
 - Benefits, perks, fun stuff, parties, traditions, etc.
- Pay for the lunch!

Where to Eat?

- Pick somewhere “neutral”
- Or ask candidate in advance
- Be sure to check for restrictions
 - Kosher, vegetarian, severe allergies, etc.

Drinks?

- Tough call!
- Don't want to make candidate uncomfortable
- Also don't want candidate to be fighting effects of alcohol in later interviews
- On the other hand . . .

(more drinks)

- Small group, informal, regular lunch place is a pub, etc., might be OK
- Ask candidate in advance if objects
 - Do not ask the reason !

(more more drinks)

- Something like “would you be uncomfortable in any way if we go to a pub” or “we usually have a beer with lunch, would that make you uncomfortable”
 - Also make it very clear that if candidate is uncomfortable it's no problem to go somewhere else

Questions

Four Types of Questions

- “Technical”
- “Fit”
- “Personal”
- “Prohibited”

Who Asks Which Questions?

- Manager or group should decide who will focus on what area(s)
 - So the candidate doesn't have to answer the same question multiple times
 - So all areas are covered
- Can split by area (commands, networking, etc.)
 - Or by question type

Technical Questions

- Specific knowledge
 - What does the ifconfig command do?
- General knowledge
 - Explain difference between TCP and UDP
- Trouble-shooting skills
 - Here's a problem; what caused it?

Purpose

- Learn what candidate knows
- Not a trivia contest!

Good and Bad

- Let's just start with an example

Bad

- What does the “tsort” command do

Worse

- What does the “-X” flag to “ls” do?
 - Or should that be “-x”?

Good

- What command shows the contents of a directory?

Better

- What are some of the options to the “ls” command and what do they do?

Why?

Bad and Worse

- Bad asks about an obscure command that most people have never even heard of and almost no one ever needs to use (at least, not these days)
- Worse asks about a flag in one specific version of “ls” (-X is GNU, -x is Solaris/XPG4)
 - Neither is “standard”
 - And isn’t used very often

Good and Better

- Good asks for specific knowledge that every candidate ought to know
 - And is easy enough to remember during an interview
- Better is open-ended, lets candidate demonstrate basic knowledge of “ls” command (and more!) without having to dredge up “trivia”

Example

- What is the command to list the contents of directories?
 - “ls”

Example (cont'd)

- Roughly speaking, the options to “ls” fall into three categories; what are they?
 - what is displayed
 - “hidden” files, long, etc.
 - how it's displayed
 - one column or multiple
 - how it's sorted
 - name, time, etc.

Example (cont'd)

- Can “ls” sort by time?
 - yes
- What times are stored?
 - atime, mtime, ctime
- What does “ctime” stand for?
 - inode change time

Example (cont'd)

- Where are the times stored?
 - the inode
- What else is stored there?
 - uid, gid, mode, permissions, size, device, inode number, number of links
- Is the file name stored in the inode?
 - no

Example (cont'd)

- How are hard links implemented?
 - multiple directory entries all point to the same inode
- So the name can't be stored there 😊
- What system call does “ls” use to read the inode?
 - “stat()” or “lstat()”

Example (cont'd)

- Is there anything in the inode that `stat()` can't read?
 - yes, the block map
- Can you explain how the UFS/FFS block map works?
 - direct blocks, single/double/triple indirect blocks

Example (cont'd)

- Going back to listing files and directories . . . Are there other commands that will list the contents of a directory?
 - “echo *”

Example (cont'd)

- What is one important advantage of “echo” over “ls”?
 - usually built into the shell
- Why does this matter?
 - in case “ls” is corrupted or got deleted

Example (cont'd)

- What is the main disadvantage of “echo” compared to “ls”?
 - requires the use of shell wildcards
- Why is this bad?
 - can exceed the command length limit

Example (cont'd)

- Why is “ls” sometimes a problem on very large directories?
 - takes a long time and a lot of memory to sort the entries
- How do you get around this?
 - GNU ls has a “don't sort” option
 - Unfortunately, POSIX ls does not have this option

Example (cont'd)

- How do you solve the problem if your version of “ls” always sorts
 - write a program in C / Perl / Python
- Do you know the system calls you'd have to use in such a program?
 - opendir(), readdir(), closedir(), etc.

Example (cont'd)

- “ls” tells you the file name and whether it has the execute bits set but it doesn’t really tell you what kind of file it is; what command tells you this?
 - “file”
- Is it always right?
 - no, it guesses about many file types

Example (conclusion)

- See how a seemingly-simple question (“what is the command to list directories”) can, if well-crafted and taken to its end, show you the depth and breadth of a candidate’s knowledge on a large slice of technology?

Bad

- What does “ypinit -s” do?

Better

- What are some commands to control YP?
 - Which command starts YP?
 - Do you remember how to start master/slave/client?
 - Acceptable answer is “all started with ypinit, using different switches, but can’t remember switches

Bad

- What does “postfix” do?

Good

- What are some common mail systems?

Better

- Mail handling can be divided into two kinds of programs; what are the names of the kinds?
 - MTA and MUA
 - If the candidate can't remember names, describe difference between the two kinds
- What are some common MTAs?
- What are some common MUAs?

Bad

- What does the “awk” command do?

Better

- Other than text editors, what commands can be used to change the text in files?
 - awk, sed, perl, python, ruby
- What significant strength does sed have over awk?
 - string substitution

(more better)

- What significant strength does awk have over sed?
 - Arithmetic
 - Functions
 - Loops/control structures
 - English!

Another Good Example

- In general, what is the purpose of the files in /etc?
- What are some of the files in /etc?
 - Tell me what they do

So What's the Point?

- Do you really care if candidate knows what “ls -x” does?
 - No!
- What matters is candidate's basic familiarity with basic commands
 - And knows how/where to look up specifics

More Point

- In my previous group, when a SA is trying to do something, it's common to ask (on IRC) “is there an easy way to do <blah>?”
- Or, during change control approval someone says “sort -u” is the same as “sort | uniq”

(more more point)

- And since all our sysadmins know basic shell programming they just go off and do it
- So during an interview, I'm more interested in learning that candidate has basic understanding

(more more point)

- And can be guided quickly/easily
- Knowing “sort -u” is less important than knowing basic shell programming, pipes, etc.
 - So testing for “sort -u” (or “ls -x” or “ypinit -s”) isn't a good use of time

An Important Note

- Don't ask a question if you don't know the answer
 - Really know the answer
 - Not just think you know

But . . .

- Things change, and an answer that used to be right may now be wrong
- If you and candidate disagree, make a note and move on

(more but)

- Do some research after the interview
 - For your own edification, and to further assess candidate
 - Might agree to send candidate the answer
 - Especially if candidate is right (“Thanks, I learned something during the interview”)

But I Don't Know
Very Much!

So What's a Junior SysAdmin to Do?

- Stick mostly to “Fit” and “Personality” (see below)
- Ask “reverse” questions

Huh?

- Most junior sysadmins are constantly learning new things
- Tell the candidate what you just learned (and how), and ask if there are other related things you should learn
- Or if there's more useful detail about what you just learned

Why Do This?

- Because you'll be learning from the candidate in the future
- Want to see how good the candidate is at teaching
- And maybe get some insight into what candidate's areas of expertise are

Other Technical Questions

- What source control/config management systems have you used?
 - What was good/bad about them?
- What config management systems have you used?
 - What was good/bad about them?

“Solve This Problem”

- Describe a specific problem
- Ask candidate to work through diagnosis
 - But tell candidate right answer is less important than his/her process
- Have candidate ask questions, give answers
 - If stuck, encourage to guess
 - But not too much

(more solve this . . .)

- (/var/spool/mail problem)

“Solve My Problem”

- Describe your current project
- Ask candidate to suggest/describe solution
- If different from yours, probe a bit
 - Ask about deficiencies
 - Or tell your solution and ask candidate to compare/contrast
- Or, maybe even say “great idea; better than mine; thanks!”

“Solve My Problem” for Junior Admins

- Describe a problem you just solved, describe your solution, and ask the candidate for ways to improve it, what you might have done differently, etc.
- This also tests candidate’s “diplomatic” skills
 - Do you want to work with someone who says “that solution sucks”?

“Meta” Technical Questions

- What is typical order of steps when paged for down system?
 - “Notify customers and/or acknowledge page; start documentation process; decide if service can be restored quickly; if not, appropriate to initiate fail-over?, etc.”

More “Meta” Questions

- Why is change control good?

Why Ask These?

- Why are these questions good?
 - Because they give insight into candidate's experience, understanding, and attitude

“Fit”

- Sometimes hard to distinguish from “Personal”
- Going to do both together

Why Ask These?

- Because team has to work together
- And candidate has to work with others in company
- Can also give insight into how candidate does job

Example

- Asking about hobbies lets you know if candidate is likely to want to get out the of office after N hours
- Some managers think this is a good thing
 - Good motivation to get job done
 - Also to be efficient
 - And, not let upper management bully group into “performing miracles”

“How Many Home Computers?”

- Does candidate like to tinker?
- Or get stuff working then leave it behind?
 - May also indicate attitude about latest/greatest v. stable, change control, etc.
 - At a minimum it opens door to those questions

Other Good “Fit” Questions

- Why like job? Dislike?
- What’s hardest about job?
- How deal with problem customers?
Bosses? Management? Vendors?
- What gives most satisfaction?

(more other good fit ?s)

- What is most frustrating?
 - Listen to these answers, especially if you are manager
 - If candidate's answers don't match "The Company Way," candidate probably won't last long

Yet More “Fit” Questions

- What are you most proud of?
- What was worst mistake?
- What do you hope to get from this job?
- Where do you want to be in 1/5/10 years?

Still More “Fit” Questions

- How do you learn new things best?

“Prohibited” Questions

- Don't ask these
 - ‘Cause they're unlawful
 - Or they can get you sued (for discrimination)
 - Or they're just plain rude

Age

- But you can ask about graduation dates, first jobs, etc.
 - And then figure it out for yourself
 - As long as your goal isn't to figure out how old the candidate is 😊

Marital Status / Kids

Religion

Political Affiliation

- Including views on world events, etc.

Medical History

Personal Habits

- Drinking
- Smoking
- Drugs

Exceptions to Habits

- You can't ask if they use drugs but you can inform candidate that the company has a policy of drug tests
 - Either pre-employment or random
 - State laws permitting, of course

More Exceptions

- If job involves travel or after-hours work you can ask if that will present any sort of problem for candidate
- If candidate opens the door you can discuss whatever pertains to the job

(more more exceptions)

- Example: Can't travel on Sabbath, you can ask if being home for Sabbath is also a requirement
- Example: If candidate follows halal dietary laws, you can ask if this will present a problem while traveling

(more more exceptions)

- If candidate mentions religion, and overseas travel is involved, you can ask if there are countries where candidate can't go
 - Depending on what passport you carry and what stamps you have in it, you may have problems entering certain countries

“Hobbies”

- You can ask a candidate what s/he enjoys doing outside of work, and you can ask questions about that
- But be careful
 - If candidate says “I’m active in my church” you can ask “what church/denomination” and/or “what sort of activities”
 - But probably not much beyond that

More Hobbies

- If candidate says something like “I run an S&M dungeon” or “I’m the leader of the local KKK chapter,” just nod and move on!

Web Searches & Blogs

- Can you do/look for these?
 - Yes
- Can you bring them up during an interview?
 - Haven't gotten an answer from a lawyer or an HR type that I trust
 - But . . .

(more searches)

- If it's posted in a public place, . . .
- And it's relevant to the position, . . .
- And if it's a "technical" or "fit" issue, . . .
- I say "yes!"
 - But I think you need to reveal how you know and/or where you saw the posting
- **BUT . . .**

BUT . . .

- If what you learn from your search is equivalent to what you what you would not have been allowed to ask in person you have to ignore what you learned

BUT . . . (cont'd)

- Letting it affect your decision is the same as asking the equivalent prohibited question
- And leaves you just as vulnerable to charges of discrimination, etc.

“Out-of-Band” “References”

- What is this?
 - Asking people you know if they know and/or have worked with the candidate
- Can you do it?
 - I say “yes”
 - But again, I haven’t gotten an answer from a lawyer

(more Out-of-Band)

- Like web searches I think you need to tell the candidate that you did this
 - And who you talked to
- If the person said something bad, maybe give the candidate a chance to tell his side of the story

After the Interview

- Last interviewer
- What happens next

Who Goes Last?

- Sometimes manager (or interview “host”) will meet candidate after last “real” interviewer
- Sometimes last “real” interviewer is HR

What Happens Next?

- Tell candidate who will contact him/her and when
- Tell candidate who to contact if no response by given date
- Get references (if needed)
- If HR goes last, have manager/host give all this to HR before interview starts

What To Do / Say

- Thank candidate for coming
- Be neutral about candidate's "results"
- Do not indicate "pass" or "fail"
 - Say something like "Will talk to interviewers, get their feedback, make a decision"

(more what to do / say)

- If results are good, and want to give candidate “warm fuzzy,” call later that day or next and say “we’re interested, will pursue” or “we’re interested, will schedule second interview” or some such thing

Follow-Up

- Make sure someone contacts candidate by agreed date, even if saying “no thanks”
- Agree with HR who will do that
- If HR, follow up with HR on agreed date to make sure it happened

Questions?

Another Example

- Bad:
 - What is the default signal sent by the “kill” command?
- Really bad:
 - What does signal #8 do?

Another Example (cont'd)

- Better:
- What command is used to send a signal to a process?
 - “kill”
- Is there more than one signal that can be sent?
 - yes

Another Example (cont'd)

- What are some of the other signals?
 - INT, HUP, KILL, QUIT, TERM, USR1, USR2, etc.
- Do the signals have numbers?
 - yes

Another Example (cont'd)

- Is there a good reason to know the numbers?
 - no
 - besides, POSIX says to always use the names

Another Example (cont'd)

- Why would you want to send different signals to a process?
 - “daemon” processes have no controlling terminal so they use signals sent by the user as a control mechanism

Another Example (cont'd)

- What are some common daemon processes that do this?
 - sendmail, named, syslogd, inetd/xinetd, etc.

Another Example (cont'd)

- What are some common things you would tell one of these daemons to do?
 - reload the config file
 - change debugging level
 - dump internal state
 - (another example)
 - and, of course, quit

Another Example (cont'd)

- Can you send a signal to any process?
 - no
- What's the restriction?
 - you can send a signal only to a process you own
 - with the standard exception for root, of course

Another Example (cont'd)

- Most signals cause most programs to die; is there a signal you can send that's guaranteed not to do this?
 - yes, signal 0 (no name?)
- Why does this exist?
 - To check if the process is still alive

Another Example (cont'd)

- Programs can ignore signals or change what happens when a signal is received; is there a signal that will always kill a program, a signal that can't be blocked or changed?
 - yes, SIGKILL

Another Example (cont'd)

- Does SIGKILL always kill the process?
 - yes but . . .
 - there are situations where the signal won't ever be delivered to the process
 - or it may take a **really** long time before it's delivered

Another Example (cont'd)

- What causes these situations?
 - the kernel is really busy and it takes a long time before the process to which the signal is being sent gets to run
 - or a process has the system in a tight CPU loop and never stops running

Another Example (cont'd)

- Do you happen to know what system call the “kill” program uses to actually send signals?
 - kill()
- Or what system call a process uses to manage signals?
 - old: signal(); new: sigaction(), sigprocmask(), etc.

Evaluations

- Please fill out the evaluations
 - Put them (where?)
- Please be honest

After Today . . .

- If you have more questions:
 - *<adamm@menlo.com>*
- Most recent slides/handouts:
 - <http://menlo.com/lisa07/m9/>
- Thank you!