

How to Find and Hire Good Technical People Or How to Find the Right Technical Support Person in 12 Easy Questions

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Introduction

Finding good technical people for UNIX support positions in the areas of system administration, network support, and system security is not a quick and easy task. Every now and then you might get lucky and have the right person come along at the right time. However, such an event would be the exception and not the general case. The process of advertising, screening and interviewing candidates for technical positions in the UNIX support arena is very time consuming and challenging, if not downright frustrating. Many times the end result is a new hire who does not have the capabilities and qualities that you originally thought. This paper presents some tips and pointers for finding and hiring the right technical people and avoiding some of the pitfalls.

The Desirable Hire

When most people set out to search and hire new employees, they usually have an idea of what they are looking for in the prospective employee. Many of us even have this “pie in the sky” idea of who we want. Sometimes employers may want just a “warm body” to fill the open slot, even if the new hire requires a lot of training. Realistically, there are three basic traits that can help guarantee a successful new hire. The first is you find a person who is capable of doing the job. They have the right set of technical skills, the right people skills and the right personality to fit in the current environment. The second is the person has the desire and the willingness to do the job. The stronger the desire, the better the hire. The third is the person is manageable and will work without a lot of interaction from management.

Finding someone with the right mix of these characteristics is the tricky part. Usually, you can find someone with two of the three qualities quite easy. Finding that perfect match requires a successful and intense recruiting and interviewing process.

Precursors for Success

Before even beginning your search, you need to first determine your true needs. All too often, when faced with an open position, managers acquire unrealistic views about what they want for the new position. List your individual needs as “must have” and “nice to have”. Develop an accurate job description for the position. A good place to start is to have each of your staff members write their own job descriptions, since they know their job best. The description should include a summary of what the position entails, a short list of major responsibilities and a list of requirements (e.g., college degree, advanced understanding of UNIX).

The second step is to determine key traits you would like the prospective employee to have. There are a number of desirable personality traits that can be classified into three broad categories. The first are the personal traits that include items such as drive, motivation, communication skills, determination and confidence. I tend to view some of the personality traits as more important than others. You may find someone with excellent technical skills, and good writing and listening skills, but who has low drive and determination. These types of people tend to take longer to accomplish tasks and are more task-oriented rather than goal-oriented. On the other hand, someone with a lot of drive, a high level of self-confidence and a strong determination will accomplish more work than someone with a higher technical skill than themselves.

Next are the professional traits such as reliability, integrity and dedication. Employees who are reliable, and have a high level of integrity and dedication are those who will usually go above and beyond the call of duty, keep management informed when they should, and make decisions which are in the best interest of the company. They are willing to work long hours when needed, answer pages at 3:00am, and meet project deadlines when it seems impossible. Clearly, these are the best kinds of employees to have.

Business traits, such as efficiency, sense of economy, sense of profit, and need for procedures form the third group. A person with a sense of efficiency will look for ways to improve processes and procedures to decrease waste of time, money, etc. A person with a sense of economy will choose efficient solutions that scale well over time, as opposed to cheap solutions that only fix the immediate problem.

After deciding what personality traits are important, you must determine which technical skills are essential versus which ones are just nice to have. The technical skills required will vary from position to position. If you are looking for a mid-level UNIX system administrator, you want someone with an intermediate level of knowledge of UNIX, who knows how to program in Perl (or some other interpretive language), and can maintain C source code. If you are looking for a network administrator, you might want someone with experience in TCP/IP networking, experience with DNS, BIND and NIS, experience with snmp, and experience with configuring and maintaining routers. If you are trying to fill a senior level security position, then you need a combination of a network analyst and a system administrator. The SAGE handbook on "Job Descriptions for System Administrators" provides a nice set of check-off lists for technical skills for various levels of support positions.

Where to Search

Once you have decided the necessary qualifications and qualities needed for the job, you can begin your search for possible candidates. The best place to start is usually within your own organization. Hiring from within is attractive for a variety of reasons. Internal transfers will be familiar with the environment, the players and possibly the job. Hiring from within eliminates the cost associated with mounting an extensive candidate search. Lastly, if you fail to start looking from within your own organization, you may end up spending a lot of time and money interviewing candidates or even using a professional headhunter, only to discover the best person for the job was already working right next door.

If the internal search does not produce any possible candidates, move on to your professional contacts and associates. You may know some ideal candidates who may be interested in moving to a new company. Or you may have a business contact who knows of good technical people looking for a change of jobs. If you exhaust your network of professional contacts and still come up empty handed, it is time to advertise the position in newspapers, electronic newsgroups and even bulletin boards at local universities (depending on the skill level you require). The position description that you use should be an accurate reflection of what you both need and desire. If there are unusual or unique requirements, such as pre-employment drug testing or the position requires a secret clearance, these should be listed on the position announcement. I have first hand experience, several times over, of candidates who were unwilling to further the interview process because of the prospective company required a pre-employment drug test.

Figures 1 and 2 list two examples of a position description that outline the same position in a large, heterogeneous installation site. Which one sounds more informative to you? Which one is likely to result in a number of resumes for unqualified candidates?

Wading Through the Resumes

If you ever had the opportunity or responsibility to review and screen resumes, you know what a challenge it can be. Part of that challenge is merely to stay awake after reading a few resumes. Resume screening is a very essential part of the hiring process. Some positions may bring in dozens of resumes, while others may only bring in a few. For example, system administrators are much more abundant than network and security analysts. Therefore, if you are advertising for a mid-level system administrator, you might receive two or

three dozen resumes. However, if you are advertising for a senior level security analyst, you will be lucky to receive four or five.

GENERAL DESCRIPTION

Network Security Support will encompass all aspects of UNIX system and network security on multiple architectures (Crays, Convex mainframes, Sun, SGI, HP and IBM workstations).

PRIMARY RESPONSIBILITY

- Monitor daily and weekly security logs and audit reports.
- Test, install and maintain security packages/products across multiple platforms.
- Provide investigation, coordination, reporting and follow-up of computer network security incidents.
- Help define, produce, and maintain official security policy and documentation.

MINIMUM QUALIFICATIONS

- US Citizenship.
- An intermediate level of knowledge of UNIX (as defined in SAGE booklet).
- Practical experience in computer security in a heterogeneous wide-area network.
- Familiarity with common break-in mechanisms and vulnerabilities of UNIX systems and be experienced in the application of procedures for resolving and mitigating network security threats.
- Knowledge and experience of TCP/IP networks, Understanding of the OSI seven layer model.
- An intermediate-level of knowledge of C and shell programming languages, with a good understanding of Makefiles.
- Good interpersonal skills enabling interaction with a diverse customer base and the ability to manage priorities with assigned responsibilities.
- A BS/BA in Computer Science or associated degree and three to five years of experience in a heterogeneous UNIX support environment.

Figure 1. Example of a Position Description

Resumes come in a variety of formats. The most common and easiest to decipher is the chronological resume, which provides a chronological history of employment and experience. Another is the functional resume, which lists major skills and accomplishments. The functional resume will rarely provide a chronological history of employment. Functional resumes are sometimes used by senior professionals who wish to keep their resumes to an appropriate length. However, they are also used by people who wish to hide gaps in their employment history and by people who change employers frequently. The combination resume, which combines the best elements of the functional and chronological resume formats, is another common format. Combination resumes tend to be the most useful since they provide both a chronological history of employment and highlight major accomplishments.

Deciphering resumes can be both entertaining and difficult. People tend to exaggerate their skill level and achievements on resumes. A common occurrence on resumes is referred to as the "Apollo Syndrome", after a low skill level employee claimed partial responsibility for the success of the Apollo mission by serving coffee to the mission support specialists. For UNIX technical support positions, you might find something like "I played a major role in the overall redesign of computer operations, which stream-lined time to complete system administration tasks." What the person may actually be saying is that one day they helped rearrange the computers in the lab to be closer together so it would take less time to load tapes into the tape drives.

The entertaining part of reading resumes arises from some of the accomplishments or skills that a candidate might list. During one resume screening session I read a resume, which up to a point, had outlined some nice UNIX support experience. Then the next job listed was for work the person had done at a fast-food restaurant. I was somewhat shocked that someone would include experience that was not relevant to the

type of job they were currently seeking. I have also read a number of resumes that were overloaded with “buzz words” common to UNIX support positions. An example of an overloaded sentence might look like: “Extensive experience in a heterogeneous UNIX support environment with an emphasis on kernel configuration, internals, performance tuning, snmp network management, DNS, NFS, AMD. For all you know, this particular person could have been an administrative assistant for a UNIX support lab, or they could really have three to five years experience of system administration work in such a lab. Reviewing resumes requires one to maintain a realistic perspective on what they are reading -- remember to question anything that looks too good or sounds too far out.

GENERAL DESCRIPTION

Network Security Support will encompass all aspects of UNIX system and network security on multiple hardware architectures.

RESPONSIBILITIES

- Monitor the appropriate logs and audit reports.
- Test, install and maintain security packages.
- Respond to computer security incidents.
- Participate in security policy and documentation development.

MINIMUM QUALIFICATIONS

- An in-depth knowledge of UNIX.
- Experience with computer security issues and situations.
- Knowledge and experience with networks.
- Knowledge of C and shell programming languages.
- Good interpersonal skills.
- A BS/BA in Computer Science or associated discipline and three to five years experience in a UNIX support environment.

Figure 2. Example of a Position Description

Resume screening will form the first cut for the interview process. This process has been automated, to some extent, in larger companies with the use of resumes scanning software. The recruitment departments scan in all resumes and run them through a software program that looks for certain words and phrases. The invention of such scanning software has increased the use of “buzz words” in resumes since people assume that a computer is doing the first pass analysis. If scanning software is used, then the interview team and hiring managers will have fewer resumes to read.

If you still work at a facility that manually reads all resumes, then you have a bit of work cut out for you. My experience has been that it is best to read through resumes as they come in, rather than wait until you have a whole stack. Attempting to wade through too many resumes in one sitting can be counter-productive. As you read through the resumes, highlight important elements such as college degree, specific experience which is of interest to you, and projects which look impressive. The items you highlight should be items you want to ask about during the phone screening or on-site interview process. During this screening phase, you should discard any resumes where the candidates do not meet the minimum requirements. Make at least one pass, preferable two through all resumes. I have found it useful to rate each resume on a scale of one to three, where three is most promising and the ones you will want to phone screen first. After reviewing the resumes you should have two piles, those to be discarded and those to be further considered via a phone screen. The phone screening process tends to be a little more tedious and time consuming than reading resumes, as you will need to spend fifteen or twenty minutes on the phone with each prospective candidate. Phone screening will form the second phase of your candidate search. The phone screening process should be used to ensure candidates meet the minimum job requirements and have a strong interest in the position. Therefore, you might want to begin the phone screen with a short summary of the position and discuss any company specific policies such as pre-employment drug testing. I recommend this because I have done several phone screens where I left it to the end to mention the company

policy regarding drug-testing, only to have the candidate abruptly end the conversation and hang up. Now I always include special company-specific policies during the first five minute, if appropriate.

You should have several questions you ask during the phone screen to eliminate additional candidates who are on the low-end of the qualification scale. These so-called “knock-out” questions will vary from one position to the next. The phone screen format should be similar for each group of resumes for a given position. There are several key bits of information you should obtain during a phone screen in addition to ensuring the candidate has the required technical skill level. These should include salary requirements, confirmation of employment history, confirmation of education and an idea of their strong likes and dislikes about their current position. Figure 3 lists some of the questions that I have used for phone screening process.

1. How many years of UNIX experience do you have?
2. How would you rate your UNIX skills on a scale of one to ten?
3. Are you familiar with C, Perl, Bourne shell programming?
4. When was the last time you wrote a complex C program from scratch?
5. What UNIX platforms to you have experience with?
6. Was this experience at the user level or support level?
7. What hardware platforms do you have experience on?
8. Can you describe to me what inetd is?
9. What is your educational background?
10. Why are you interested in this position?
11. What do you like most about your current position? And Least?

Figure 3. Phone Screen Questions

At the end of the phone screening process, you should be left with two groups, a discard or standby group, and a small group of candidates to bring in for an on-site interview.

Basics of the Interview Process

The on-site interview will form the final phase of the candidate review process. Hence, it should be the most thorough. I can remember when I first started interviewing for a position as a junior programmer in the early 80's. The interview style was very dry and uninformative, but most likely typical of the interviewing style for the 80's. The on-site interviews were done by the hiring manager and maybe someone from human resources. The entire interview process would last two to three hours and would take place in a conference room or small office. The candidate would not have an opportunity to see the work environment or to meet other people with whom they would be working. The end result of such an interview is both the candidate and the hiring manager would frequently come away with insufficient information for making a good judgement.

The interview style of the 80's is insufficient for the high-technology jobs of today. There are a large number of well-qualified candidates for the available positions. On-site interviews need to be interactive and candidates should be given a tour of the facility and should be introduced to some of the staff. Candidates should be interviewed by several technical people, and not just the hiring manager and the HR staff. More importantly, the interviewing style must match the needs of the position. The higher the level and the more technical the position, the more intense the interviewing process.

There are several varieties of interviewing styles and questioning methods. Sometimes the most effective interview will be a combination of styles and questions. When looking for candidates to fill UNIX support positions, I have found that a combination of situational, personality profile and stress interviewing styles to be most useful. The situational interview is one where you bring the candidate as close to the work environment and tasks at hand as possible. For example, if you are interviewing a candidate for a system administration position, you might take them on a tour of your facility and explain how your remote file system sharing is accomplished. Then sit them down at a terminal and let them review the configuration

files for automounter and then ask for their opinion. Or explain the backup scheme for your site and ask them how they might improve the performance.

The personality profile interview is aimed at determining a candidate's personality makeup. If you have a strong team atmosphere, then you need to know if the candidate will be a good team player. Or if you need a "one person show", you need to know if the candidate is a strong self-starter who enjoys working alone. Some of the questions you might ask to obtain the needed information are listed in Figure 4.

1. How important was communication and interaction with others on the job?
2. Do you enjoy working with other people with similar interests as you?
3. Do you enjoy working in a team atmosphere or would you consider yourself to be more of a loner?
4. In the past, when you had difficulty dealing with a coworker, how did you resolve the situation?
5. How would you rank yourself among your current peers?
6. When beginning to work with new people on a task or project, how do you go about getting to know them and understanding their methods?

Figure 4. Sample Personality Profile Questions

The stress interview scheme is used to determine how well the candidate will work under pressure. Sometimes candidates will be unduly stressed just by asking them to sit at a workstation and perform some simple technical tasks. If you have a large site with several hundred systems and just as many users, the system administrators will be doing a lot of fire-fighting. Using the stress interview scheme will give you some indication of how the candidate will react to a constant flow of problems. Some of the stress interview methods used at a site where I once worked included: asking the candidate to resolve a program bug in sendmail; asking the candidate to write a short shell or Perl program, or having the candidate review and explain the automounter configuration files.

A Successful Interview Scheme

Through trial and error at my former employer, we developed a combination interview style that proved to be quite successful. The interview scheme has been in use there for more than six years. Over time, the process was refined as the various interviewing teams gained more experience from interviewing dozens of potential candidates for UNIX support positions. During my tenure, there were a fair number of successful hires and only just a few of the "bad hires".

The on-site interview process would last about five to six hours, which included lunch. The candidate would be instructed to dress according to the standards of the company or facility. At my former employer, this meant a casual dress style. However, "casual" was always qualified to exclude shorts and sandals. The interview would normally start around 9:00 and end around 3:00pm.

The interview process consisted of an interview team of four to six people who worked in the various support groups at the facility and one person who was part of the management team. Each member of the interview team developed a short list of technical questions, usually on a specific area, which they would ask every candidate interviewing for a specific position. One member of the interview team would focus on C programming questions. Another member would focus on UNIX administration tasks. One person should have a general focus, such as general UNIX questions(e.g., What is the purpose of inetd?). Each member of the team was allotted thirty to forty-five minutes for their interview slot. During one of the early slots, the candidate would be taken on a tour of the facility. One of the interview slots was used as a lunch period, where several people might attend and ask additional questions.

After the last interview, the candidate would meet briefly with the lead interviewer to go over any remaining questions. During the wrap-up session, the candidate would be asked about their interest level in the position and the company. After the candidate would leave, members of the interview team would have a round-table discussion where each member discusses how the candidate did in their interview slot. If several candidates had been interviewed for the position, members of the interview would rate the current

candidate with the previous candidates. As part of the round-table, members of the interview team can find out if the candidate answered any technical questions based on information they received in an earlier interview slot. At my previous employer, we found this to be a frequent occurrence, where rarely the candidate says they only just learned the information that morning. Another frequent occurrence was that some candidates IQ level appeared to drop after the lunch break. Most times this was due to the candidate having studied for the interview and was not able to maintain the false skill level all day.

A very important part of our interview scheme was to test the technical capabilities of the candidate. Hence the use of the situational interview style. Over time, we refined our technical questions to where members of the interview team would joke that even they could not pass muster. The technical questions used should cover the entire realm of responsibilities for the position you are trying to fill. For example, if you are interviewing for a system administration position, your questions should cover such topics as DNS, NFS, AMD, C programming, shell programming, network trouble-shooting, performance tuning, etc. The questions should be of different levels of complexity, where you would start with easy questions and work up to more difficult ones. You don't want to stress out the candidate during the first interview slot. The questions should be worded such that the candidate will provide you enough detail in the answer. Hence, you should ask a lot of leading and open-ended questions. Part of testing their technical capabilities should include having them perform hands-on work at a workstation.

My part of the interview scheme was to ask the general UNIX questions. Many times I was able to judge a candidate based on their ability to make it through my interview. Over the years there has only been a handful of candidates where were able to answer all of my questions. Those were definitely people whom we extended offers to, most of whom accepted. Figure 5 contains a list of some of the technical questions that were used at my previous employer.

1. Describe what happens when you log into a system where your login shell is set to `/bin/sh`? What programs will be executed?
2. How could you print out the first and third fields of the `/etc/passwd` file in a nice format?
3. What system calls does the shell use to run a program?
4. What system utility is used to log system messages? How does this utility know what to log and where to log it?
5. What is an RFC? Where do you get one?
6. Write a shell for-loop that takes input from a text file containing a list of file names, and then performs an operation on those files?
7. How would you update a system configuration file (e.g., `/etc/syslog.conf`) on a group of 50 systems which were all alike? Assume these systems trust one host and you can be certain the file to be updated is the same on every host. How would you update the file if it might be different on each host? (e.g., you need to add a new line or change an existing line).
8. How would you locate a shareware program on the Internet that you were interested in?
9. What is the purpose of the `inetd` program? What are some of the other programs/daemons associated with `inetd`?
10. How would you remove all files named "core" for the system on a nightly basis?
11. What are the main differences between a network based-auditing tool and a host-based auditing tool?
12. What type of attack program is `land.c`?

Figure 5. Sample Technical Questions

Musings from Past Interviews

During the years of interviewing dozens of candidates, there have been those that have provided the interviewing teams with much amusement. We had many, different types of candidates walk through our doors. Some of those candidates left in a humble state, realizing they were not the senior-level system administrator they thought they were. Others were shown the door after a few interview slots.

Below are some of the more amusing answers we have received from some of our past candidates:

Question: What is the difference between a hard NFS mount and a soft one?

Answer: "A hard mount is listed in the fstab file and a soft mount is done on the command line."

Question: What are some of the major differences between BSD and SYSV UNIX?

Answer: "The only difference between BSD and SYSV is that one has a /etc/hosts file and the other uses DNS."

Question: Have you ever written a Perl program?

Answer: "I tried to use Perl once, but I couldn't figure out how to compile it"

Question: Can you tell me the purpose of the inetd program?

Answer: "inetd is the Internet Routing Daemon. It routes information from one host to another."

Question: Describe to me your experiences with administering SGI machines.

Answer: "Well, I haven't actually administered an SGI, but I have seen one."

Question: Can you tell me what an RFC is and where do you get one?

Answer: "Really Fouled-up Code. Ask (name deleted) for anything he wrote."

Question: How do you build a Kernel for SunOS?

Answer: "You put the CD into the CDROM drive, mount it and type sunupgrade."

Question: What is the difference between a telnet session and a rlogin session?

Answer: "For telnet you have to type a password, for rlogin you don't."

Question: Why is Berkeley, CA often associated with UNIX?

Answer: "They used UNIX a lot, even the hippies."

Question: How would you find out about a software patch for the major vendor you work with?

Answer: "Look on the new CD they send you every once in a while, it has all of the patches."

Lessons Learned and Key Points to Remember

Through the years of interviewing candidates, there have been several important lessons learned. The one that most readily comes to mind is that many candidates interviewing for a UNIX technical support position often have an inflated view of their skills, especially if they currently work at a small-scale installation of less than 50 machines. If you are out interviewing for a job as a UNIX support analyst, I suggest you review the SAGE booklet, "Job Descriptions for System Administrators" to get a good indication of the skill level you are at. If you are not sure about a question that you are asked during an interview, it is better to ask for clarification or simply say that you are not familiar with the particular subject. If you try to bluff your way through the questions, your answers might end up as an example of an "amusing answer" like those listed above.

Another major trend is many candidates will display a higher level of technical skills before lunch, than after lunch. I was never able to determine if this was a function of the candidate being tired or was due to the candidate not being able to maintain a false level of ability. There have been those candidates who have passed through the "interview doors" who gave very text book answers and had obviously studied for the interview, but were not able to maintain the "act" through the entire process. In my own experience of interviewing for a new job several years ago, I found that I was mentally drained after a few hours of answering questions. Interviewing in the 90's is much more difficult than interviewing in the 80's. As an interviewer, try to place yourself in the role of the candidate before making any final judgements about them. A candidate who does well through the entire interview process is probably someone who will do well under fire in a fast-paced support environment -- someone who would make a great addition to your team.

The last item I would like to point out is that it is O.K. to end the interview process early. If you feel the candidate is definitely not a good match for the job after a few interview slots, then don't feel bad about showing them the door early. In my experience in interviewing, I always made it a point to tell candidates that our policy was to end the interview process early if we feel there is not a good fit. If you are on the other side of the table and are interviewing for a job, which you soon discover is not a position you want, don't feel bad about cutting the interview process short. Time is a precious commodity these days. Both sides will feel better if time is not wasted.

Conclusion

The process of advertising, searching and interviewing candidates for a technical position in a UNIX support environment is not easy. Many times there are a lot of candidates for a particular position. Other times you may only get a handful of resumes, none of which look too promising. All the while, there is work that still needs to be done while the interview process continues. This paper has attempted to provide some useful tips and pointers for finding and hiring good technical people. The desired result is a successful hire, who will be a happy, productive and dedicated employee, at least for three or four years.

No, one interview scheme may fit all situations. The particular requirements of a site will dictate the best interview method to use. Although this paper was written mainly for people looking for candidates to fill a position, it can also be useful to people who are searching for jobs. Try not to make the mistakes that were pointed out in this paper. And to the people on both sides of the interview table, good luck in your search!

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