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**Staff Manager**  
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**Job Description**

The *Staff Manager* works with a team to develop and deal with software that enables different telecommunications systems to "talk to each other" either in real time or using batch processing. The staff manager is responsible for the interface among many systems so that data can be transmitted from one to another. Drawing from a background in operations research, the staff managers coordinates the work of a team of people to identify and solve telecommunications problems

**CONCEPT: Linear algebra**

You know, in real life, you can model a lot...in linear algebra form. For example, equations and matrices and so on and so forth really lay out the foundation for you to understand and translate a business problem into a mathematical model.

You can model it as a linear equation and...putting a certain constraint on it, and you try to find a mathematical solution, and this is called optimization problem in the transportation industry. And you can use that in many, many industries.

For example, when you have a lot of calls getting to your telecommunication network, how do you route those calls to different parts of the country, so you know, you don't have to build a huge amount of capacity to accommodate those calls.

But in the overall game, the fundamental problem is a mathematical problem, and by learning certain mathematical skills, it will enable you to understand those problems and to find a solution for that by looking for, say, all the possible routes between two points and then looking for ways of programming the system so that the most efficient route is taken in any given case...And then you kind of allocate resources.

You know, one of the technical problems in mathematics and especially operations research people face is called shortest path problem. It's basically--you can build a network from point A to point B and a network means that you--from this point A, you can travel to a different point and then travel to another point and finally get to point B. So you traverse many, many points in this network. The time is not only dependent on distance, but also on the capacity [demand]. The idea is that in order to send a certain number of messages from point A to point B, you have to travel different routes. What is the minimum cost or the minimum capacity needed on this network to allow you to transfer those messages from A to B and you ask, well, or build a mathematical model and figure out what is the minimum capacity needed to do that?

And you can use linear algebra ideas to, you know, you have the object function that you can model as a linear object function with certain constraints. For example, you cannot

have more than 20 calls on this line. And it's also, you know, from there to here you can model it as a linear equation which says, you know, the call on this line has less or equal to 20. And another line may be less or equal to 10 or maybe because there's costs, what have you, a certain line you have to be minimum to carry a certain amount of calls--maybe you say greater or equal to 10 or whatever. You can pull those equations together and so you have an objective and you have a list of constraints and that's kind of...a mathematical model for you to solve.

[The shortest path problem] is a particular type of optimization problem...and then you can generalize it, it becomes a network problem. You can have a [telecommunications] network problem, a different sort of problem that utilizes that same concept but is just a little bit more complex problem to solve.

**WORK SKILLS: Systems interacting**

One of the problems that we had was that, you know, when systems talk to each other, you know, when we transfer a large file to another system, then we find out that, you know, at end of a file there's a space, so one system thinks that's end-of-file indicator. It's a space. But the other system thinks that there's more things to follow.

First we had to identify what the problem is, because we discovered it when the file was being transferred. Then we discovered there's a problem because the one system's telling me that I did not complete the file transaction, but this system's telling me that the transaction is completed.

So what we did is, we brought the two teams together to try to understand what is, you know, the problem--to kind of diagnose the problem. Then we were able to pinpoint where the problem is and we created a special character called a delimiter not using the space, but a special character so indicating that's the end of the file. Those sorts of things.

The different systems have different characters, you know, and there's a mainframe system that requires certain way you're dealing with them. There's more than one system. There's different database that you can deal with. I think, you know, the problem is very complicated and how to bring every system together and make sure they're all singing the same song. I think that's really challenging work to do.

**WORK SKILLS: Selecting technology appropriately**

Well, you know, with so many changes in technology, you know, you have to make a decision. You choose this type of architecture versus another type of architecture. And you're choosing a certain type of database and not choosing a certain other type of database. You choose one application over another application. It's really--you know, there's no such product that's dominant in everything. Just like using, you know, the PC. There will be people using PC and there will be people using Macintosh and you just have to look at your requirements. Say, you know, what's the best product that you can have at this time and meet all your requirements--and you go along with that. I think it's a really tough choice and sometime you just hope you have all the choices but you don't, and you just have to, you know, make a decision and go along with that.

That's absolutely right because that's the thing that you keep in mind--that when you choose a product, when you choose an application or you choose a platform, that you have to keep in mind whether this platform will be able to evolve to the next generation and how you're going to be able to scale it and what is the performance? All those different issues--when you make that decision, you have to consider them. So you don't look just at current need but also what the future need is...keep tomorrow's in mind as well.

### **WORK SKILLS: Scalability**

Well, for example, you know, when you buy a PC, you know, a lot of people will say, okay, what is, you know, the scalability of this PC? For example, you can increase your RAM fairly easily. You can start with 32 meg of RAM and if you store more work, use that PC more, you know, you have a higher demand on your PC. You want speed or you want to go faster, you may want to extend your memory.

The same thing applies to our system development. You know, we choose a certain product. We choose a certain platform with certain applications. We have to ask ourselves, okay, this one meets our requirement right now. What about a couple years down the road...if we have more demand or the messages that need to be processed through this application change dramatically? Can this system accommodate that kind of demand? And that's what I mean, the scalability.

### **WORK SKILLS: Finding the best solution**

I think the most difficult thing for my job is really, you know, every day you find there's something new and that--that you need to learn and you never just say, oh, I think I've figured out everything out. I wouldn't consider that so difficult. I think this is really--I look at it as more a challenge because you have to talk with different systems.

You really have to have a very broad knowledge and also you have to have a spirit of cooperation to make sure, you know, all the team members got involved and were able to solve a problem in a very complex environment. I think that there's no simple solution. There's not a best solution, just many, many solutions, and you just have to pick the one that you think that meets all your requirements and go along with that.

### **WORK SKILLS: Working in teams**

I would say that we probably spend a lot of time [sitting down as a group] just because, you know...there're many, many ways you can solve a problem and finding a way that--that is going to be the--we call it the best way or better way--is going to mean taking input from each member of the team to make that decision. Of course, sometimes, you know, if there's no impact on another system, that the person who is responsible for that part of the system can make that decision. But in a lot of cases, you will find out that a change would result in many changes in another system. So we just have to talk about it and try to communicate with each other and so we all know what is [the] impact and what, you know, subsequent activity we need to do in order to accommodate that kind of change.

### **WORK SKILLS: Using Math**

It's really that mathematics, not only kind of teaches you how to add numbers, but really helps you to think about things more logically and especially when you try to diagnose certain problems and you try to figure out what's the problem--whenever you have a problem with your system or what-have-you. You're kind of putting things in different perspective. I think mathematics is something that you get--I think it's going to benefit

you for the rest of your life. You're thinking things in a more logical and a methodical way.

I think, you know, by doing things logically and methodically, I think it's going to help you to work better and more efficiently. I think it is very important to understand mathematics and especially in computer science work. I mean, now a lot of things are really based on mathematics, and you will find a lot of applications like I mentioned about the telecommunications industry and other industries in which you can use mathematics.

**JOB/CAREER: Job overview**

I'm a staff manager at AT&T, southwest local services, who develops the system for the local service at AT&T. I have a small team that, you know, we deal with the software that will enable different systems to talk to each other either on the real time or on the batch process.

The part I'm responsible for is to interface between many, many systems, so, you know, one system's talking one language, another system talks a different language. My responsibility is [to ensure that] we can transmit data between the two systems so they can understand each other.

**JOB/CAREER: What is operations research?**

What it really does [operations research]--it's a kind of combination of computer science, mathematics, and a management science. What it does do is--look at a complex business problem and try to figure out a way to build a mathematical model and then you build a computer program to try to solve that problem or to achieve a certain objective that you set when you build this mathematical model.

**JOB/CAREER: Background**

I have a Ph.D. in operations research. I graduated from SMU in 1990 and I worked in different positions in different companies. I started with a gas and electric company and worked there for a while and then went to American Airline and worked as software developer for their Sabre division. Then I joined AT&T in 1994. I worked at AT&T as a senior member of technical staff at AT&T Bell Labs for several years before I came to here to join the local service division.

**JOB/CAREER: Job satisfaction**

I think, you know, the most I like in my job is the challenge. You know, every day you have something new and it makes it exciting and you learn something new. And just every day you learn something that you don't know, and...you work with a group of people who're very talented and very skilled and [so you] not only learn, you know, from your own work, but you learn from other people. So I think it's continuous learning. It's something that I really enjoy.