Get the Job You Want in Computer Graphics

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Class Description: What does it take to get a job in the computer graphics field? A top career coach and recruiter reveals the secrets of how to create an irresistible resume and showcase your talent in a demo reel to get the job you want. Sample resumes and demo reels are included. Guidelines for cover letters, portfolios and career tips and advice are included. Career Coach and Recruiter Pamela Thompson will be joined by Fran Zandonella who will present ideas and strategies for people seeking technical and programming jobs and Stan Szymanski, of Sony Imageworks, who will explain how to interview, negotiate and analyze the offer letter.

Prerequisites: No prior course is required. This course is designed for those seeking a career in computer graphics or for those who train others in computer graphics, such as teachers. The content is also appropriate for a veteran in the industry who is searching for his next position.

Syllabus:

Introduction:	5 minutes (Thompson)
Resumes and Cover Letters:	20 minutes (Thompson)
Portfolios:	10 minutes (Thompson)
Technical Jobs:	50 minutes (Zandonella)
Demo Reels and Shot Breakdown:	50 minutes (Thompson)
Interviewing and the Offer	40 minutes (Symanski)
Career Tips:	10 minutes (Thompson)
Conclusion:	5 minutes (Thompson)
Q&A:	35 minutes (Thompson, Zandonella, Szymanski)

Get the Job You Want in Computer Graphics

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Pamela Kleibrink Thompson is a recruiter/hiring strategist for such clients as Laika, Technicolor, Blue Sky Studios, Toybox, Framestore, Digital Domain, and Walt Disney Feature Animation. She is a career coach and consults with colleges and universities to design animation training programs. Her animation production background includes features such as *Bebe s Kids,* the Fox television series *The Simpsons*, and the original Amazing Stories episode of *Family Dog*. She writes a monthly column on Animation World Network (http://mag.awn.com) called The Career Coach. She is available for personal career coaching, speaking engagements, and recruiting. Contact her at PamRecruit@q.com

1 Introduction

What does it take to get a job at a visual effects, computer animation or interactive company? This course shows how to open the door to interviews, put your life on a one page resume, and showcase your talent in a three minute or less demo reel. Getting you an interview with someone who can hire you is the purpose of the resume, portfolio and demo reel. Prepare them with care. Ask others for feedback before you send them out.

Everything you submit should be labeled clearly with your name, phone number and email address. Make it easy for the employer or recruiter to see your work and make it easy to contact you.

Many studios have the same basic requirements for submission: a resume, a cover letter specifying your area of interest, a portfolio (samples of hand skills and traditional work), a demo reel and a shot breakdown. These course notes will discuss each of these requirements.

2 Resumes

If your resume doesn t work, neither will you.
As a recruiter and career coach I have seen thousands of resumes.
Here is how to make yours effective:

Make sure your contact information is on your resume and it is current. This includes your name, phone number (with current area code) and email address if you have one.

Make sure the contact information is easy to read and easy to find.
Use a font where it is easy to distinguish a numeral 1 from the lower case letter l and in a large enough type face to be easily read (at least 10 point) Don t use a type font that is ornate.

A resume is not the place to be creative. One resume posted at a SIGGRAPH career

center laid out all the information in a spiral so you had to spin the resume to read it. Don t make someone hunt for your phone number or email address. The best place for contact information is near the top, right below your name.

When emailing your resume to an employer or answering an online ad, don t send a web site url and expect the employer or recruiter to visit that web site to find your resume. If you want someone to get your resume, email it to them as a message, not an attachment. (Sometimes downloads don t work and many companies don t accept attachments due to viruses.) If you email a resume, make sure your name, phone number and email address are on it. Make sure your resume is readable without HTML code embedded in it. Don t email your resume as a jpeg attachment. They don t print well and most employers won t open them.

Use bullets and break up large paragraphs of text. You don t want your resume set aside to be viewed later due to huge blocks of type that challenge the reader.

List your skills. Be specific. Don t say a variety of software packages. List the specific software you use. Don t bury your skills in a paragraph and make the reader hunt for the information.

List your experience in reverse chronological order. Put the most recent information first.

If your resume is more than one page, put your name, phone number, and email address on each page.

Your resume is not your life story. Include only the information that is relevant to an employer. If you have 5 years experience in the computer graphics field, employers don t care that your first job was at a pizza parlor.

Your resume should tell who you are what you know (skills), what you ve done (accomplishments), and what you want to do (objective or goal). If you are changing careers, focus your resume on the job you want rather than the job you have. If your resume shows a variety of jobs, make sure you have an objective at the top that indicates what job you re seeking.

Use paper that copies well white or off white.

Test your resume. Copy it and make a copy of the copy. Surprised? Orange and dark blue paper turns black. Marbleized paper makes your resume look like someone poured coffee over it.

After doing the copy test you ll find those beautiful graphics in the background are now some of the ugliest stuff you ve seen on paper and what s more, you can no longer read your phone number or name which looked so crisp in front of the graphic on the

original. Graphics or artwork on a gray scale behind the type doesn t copy or scan well.

If you want someone to get a sample of your graphics include it on a separate page with your name and contact info.

Proofread to get rid of typos and spelling mistakes. Ask a friend to review it too he or she may catch an error in your phone number you missed.

Tips for a better resume:

Many companies scan resumes into computer databases so select a font that won t confuse the computer.

If you have a web site, include the address on your resume along with your email address and current phone number (with area code).

Review your resume every 6 months to update your skills and accomplishments. Emphasize accomplishments, not responsibilities.

Your resume is a marketing tool. It is a chance to brag. Highlight any awards or special accomplishments.

List your software skills and include the version of the software you use Maya 7.0 not just Maya.

Keep the layout simple. Make your resume concise and easy to read.

A resume needs to communicate clearly.

A simple format such as this does the job.

Name
Contact Info
Objective
Skills (use bullet points)
Experience
Education

3 Cover Letters

A cover letter should be sent with your resume. Keep it short. Use it to highlight your best skills, or mention qualifications not shown in the resume.

Cover letters should always be addressed to a specific person. It s good to point out if you have a personal connection met you at a SIGGRAPH meeting, referred by someone, read about you in a magazine, etc. That s why it s important to go to all those events so you can hear about job openings and mention people s names in the cover letter!

Cover letters should state what you want to do for the company, what job you are applying for, and why you are right for that job.

Cover letters should demonstrate some knowledge of the company. Make it clear that you understand the needs and goals of the company and can be productive immediately. What special skills or expertise are you offering? What advantage will the company have if they hire you?

Cover letters should be brief, but give some insight into your personality. You can use them to point out an asset you bring to the company that might not be obvious in the resume.

4 Portfolios

If you are an artist, an outstanding portfolio and demo reel is essential.

A portfolio of life drawing, illustration, photography (if you are interested in lighting), sculpture (if you are interested in modeling), character design or color design is a big plus. A foundation in fine art and training in aesthetics is advantageous for any aspiring CG artist. List these skills or education and training on your resume. You can include samples of traditional work on the end of your reel or include a disposable portfolio with your reel.

DEMO REEL DO'S

✪*Include life drawing or other fine art work such as sculpture, painting or photography at the tail of your reel.*

Include only your best work and put your strongest piece first.

Label each piece in your portfolio with your name and contact information as well as the medium the piece was done in.

Label each piece indicating what project it was for and if it is your original design, state that.

Pay attention to the layout of your portfolio so your work is presented, not just haphazardly thrown together.

Label the spine of your portfolio with your name and contact info as well as the cover and include a resume inside.

5 Demo Reels

What should you show?

Before you create your reel, assess your strengths, skills and interests. There are many different jobs for artists. Make sure your demo reel and portfolio are relevant to the job you want. If you want a job as a character animator, your reel should emphasize acting and performance, not compositing. Your demo reel should reflect the very best you can do. Keep it short make them want to see more.

Shot Breakdowns

The shot breakdown (also called a demo reel breakdown) briefly describes your contribution to each shot and the tools used. Shot Breakdown Example: Shot 1: Witch Melting animated the witch melting using Maya 7.0; created the textures using Photoshop CS2.

If you did everything on your reel, say so. Never claim anyone else s work.

You can include a written shot breakdown or you can include slates on the tape before each segment describing what you did or superimpose the description over each scene. The breakdown identifies your responsibility on each sequence and shot and software uses (if applicable) and must be included.

The Breakdown Sheet/Credit List

Breakdown List Sample

Name
Demo Contents
Phone/Email
Address

	Directed	Produced	Captured	Textured/ Retouched	Mapped	Modeled	3D Effects: Animated 2D	3D: IK/Character	Rotoscoped/Tracked	Animated 3D	Composited
Animation Logo	•	•	•	•	•	•	•			•	•
Second Wife: Eye Reflection				•	•	•				•	•
Without Warning:Butterflies, Background					•	•			•	•	•
Orion Pictures Logo	•				•	•	•	•		•	
Dennis The Menace 2: Bee Sting					•	•		•	•	•	•
Elmo In Grouchland: Fireflies					•	•			•	•	•
Long Kiss Goodnight: Blood					•	•				•	•
Rhino Logo					•	•				•	
NASA: Neil Armstrong Restoration				•	•					•	•
Rainbow: Look, Ma – No Hands!				•	•	•	•	•		•	•
Entertainment Tonight: Show Opening					•		•				•
AquaTrek Logo	•	•			•	•	•			•	•
Terminal Force 2: Plasma Tunnel (Space)				•	•	•	•	•	•	•	•
Terminal Force 2: Escaping Spaceship				•	•	•	•	•	•	•	•
Terminal Force2: Plasma Tunnel End					•	•	•	•	•	•	•

What format is acceptable?

Check the company s web site to see what formats are acceptable. For example, Hybride, a company in Canada, will accept reels in DVD format, VHS ½ NTSC or PAL. Hybride does not want to receive CD Roms or web site addresses. Most companies will not open attachments. Dreamworks will not look at jpg files or website links. Check company web sites to find out what the specific demo reel and portfolio requirements are for the areas that interest you.

How are reels usually reviewed? At a group meeting, artists review many reels. This means that you must catch their attention from the start so put your best work first. The weakest part of your reel will also get their attention. If you have 5 years experience in the industry, work you did as a student should not be on your reel or in your portfolio.

When should I submit?

Companies accept submissions year round. If you submit your materials to companies at SIGGRAPH or any other conference, it may be a few months before your work is reviewed as companies get swamped with submissions during this time. It s better to submit your reel 3 to 4 months before a conference. Be patient and keep working at improving your skills. It s okay to submit new work every 6 months, as your skills improve.

Quick tips

For artists, a demo reel and portfolio are more important than a resume.

Always include a resume and a shot breakdown with your reel. Your shot breakdown should always include your name and contact info. Your shot breakdown is a written outline that describes each shot and what you did for that segment. You could slate each shot on the reel with this information instead. Your breakdown list could include screen shots of the work on your reel.

BREAKDOWN LIST

Sometimes called Shot List

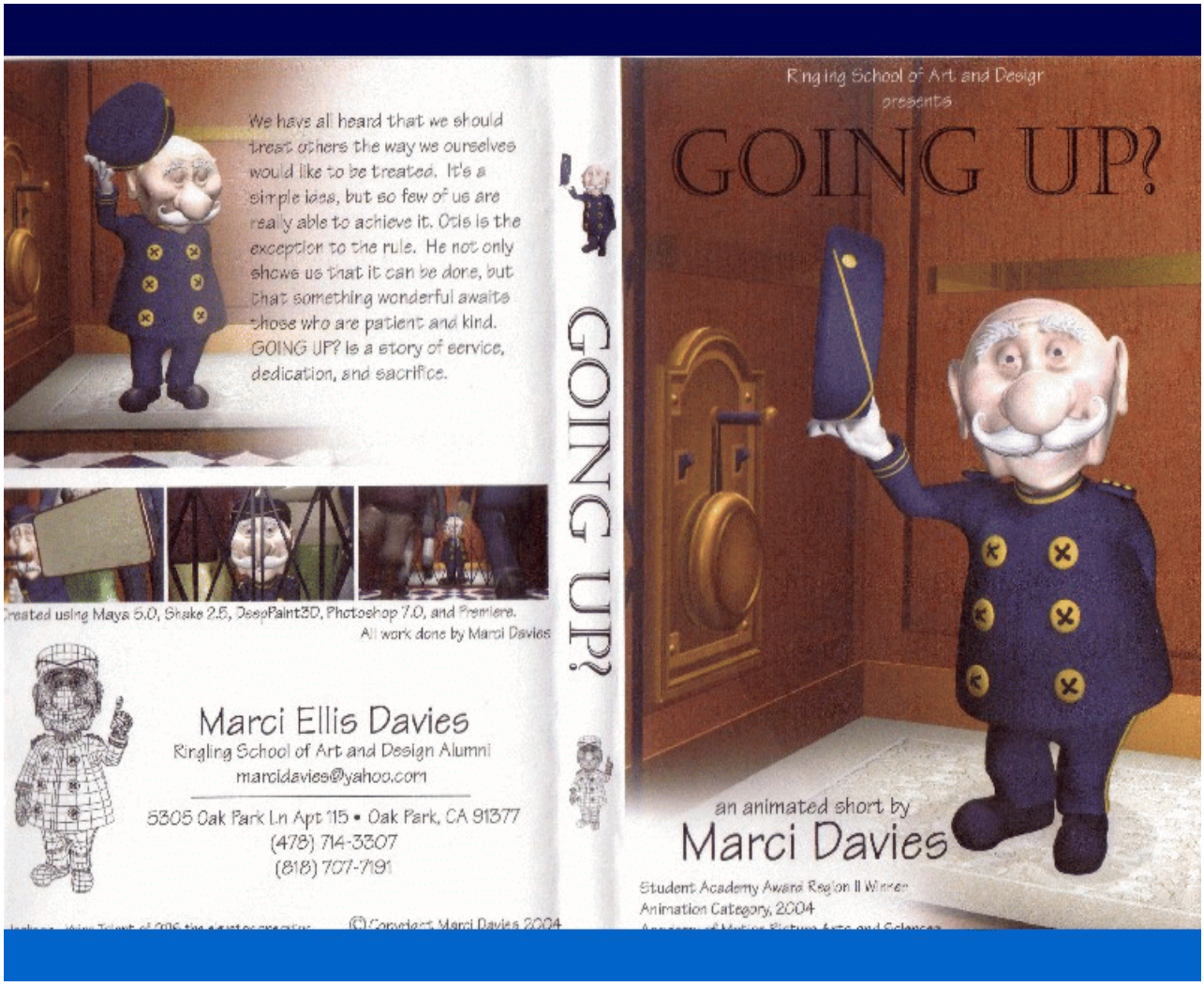
Pu the very best segment first.

Remember your audience sees lots of demo reels and portfolios. Keep it moving.

Demo reels will not be returned so never send your only copy to anyone.

Your reel must be labeled with your name and contact info (phone and email address). A screen shot of work from your reel helps it stand out from a sea of black video boxes or generic DVD cases. Remember to label the spine of your reel as well.

A DVD box with screen shot and contact info.



Include slates on your reel or superimpose graphics with your name and contact information in case the label falls off. A recruiter at Animal Logic in Australia once bemoaned the fact that his office had piles of fabulous reels that he couldn t bear to part with even though there was no contact information on them. He had no idea how to find those talented artists.

Label your reel and include an end slate on your reel with your name and contact info.

Your demo reel should:

Contain only your best work and be of high caliber.

Be representative of your recent work and showcase your skills and talent.

Be *no longer than* 3 minutes. It can be shorter. People have been hired on 15 seconds or less. It s better to be impressive than excessive so take out anything that is not top quality.

Be a ½ VHS cassette in NTSC format unless the company accepts other formats. (This is the format almost all companies can deal with in the United States. If it s a PAL tape, be sure the company has a way to view it). Everyone has a VHS machine not everyone has a DVD, even today!

If you submit a DVD, keep the DVD menu simple to understand and easy to navigate. Test your DVD in several machines before you send it to ensure it will work.

Don t include color bars or shrink wrap your reel.

Never send masters or originals.
Minimize erotica, satanic and violent material.
Don t use loud, obnoxious music or elaborate sound. We are interested in the visuals, not the sound design, music or editing so don t work harder on the sound than the visuals. You may want to use music that is in the public domain such as a classical piece; but since your reel is not for commercial purposes other than for job hunting, copyright is not an issue. We often turn off the sound when reviewing reels.
Don t do a chronological work history or include mediocre work.
Don t save your best stuff for last. The viewer may never get to it.
Don t include live action film without animation or computer graphics unless it is to show

your compositing skills.
Don t send the exact same reel in 6 months later. We have very good visual memories.
Don t send unfinished work or early tests unless you re showing the progression of a finished shot.
Don t expect prospective employers to visit a web site to view samples or a resume.
Don t email images, unless you are requested to do so.

6 Jobs in Digital Visual Effects

There is a specific sequence of steps in any visual effects shot using computer graphics modeling, skeleton/bones/set up, texturing, animation, lighting, and compositing/rendering. If you are skilled or talented in three or more of these areas you may want to consider a job with a small company, that uses generalists. You ll have an opportunity to do many different jobs. If you are a specialist, you ll probably be happier at a larger company where you will do one specific job and develop a specific skill set that you do well.

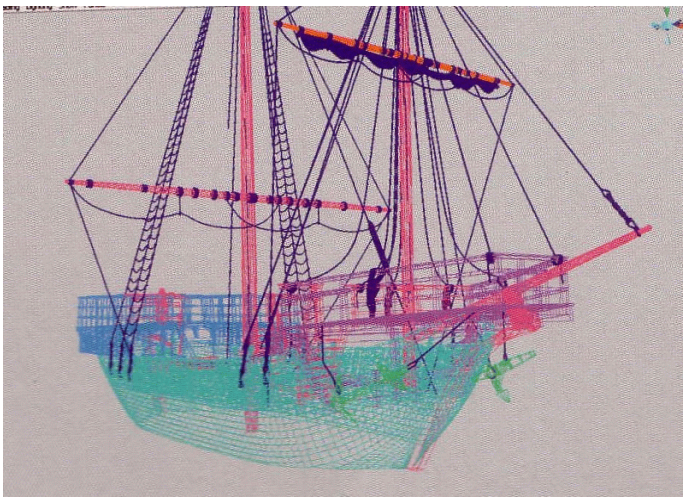
This section will show you what is involved in each of these steps and the skills required You will also find out what a studio wants to see in a portfolio and demo reel from CG applicants for each specialty.

Before you attend any large conference such as SIGGRAPH, check out the web site to find out who will be recruiting at the conference. It s a good idea to send your materials to the company as soon as possible before the show as companies are swamped with applicants during the conference. They will have more time to review your work before the show. If they review your work before the show and like what they see, you may be given an opportunity to interview with company representatives.

Modeling

In 2D animation, the first step in the process is prop, character and background design. In 3D computer animation this is called modeling. A model is a virtual object that is created, colored, textured and animated using computer graphics Modelers are responsible for creating complex, organic models needed for character animation, prop elements for effects, and virtual sets for layout. Modelers must build models that are high quality, efficient to render, and easy to animate.

The model begins as a series of lines called a wireframe that outlines the shape of the object. These wireframes communicate just the basics about the 3D object to come. While incomplete, these transitional illustrations have the benefits of being easy and quick for the computer to calculate and manipulate. The elementary shapes of 3D objects can be quickly rotated in space and viewed from different angles.



Skill set: Know how to sculpt how to model things in the real world. Know how to draw. A background in art, design, architecture, or film is a plus. Some general animation skills are needed for character modeling and testing.

Demo Reel/Portfolio tips: Reality is key. If it is a horse it should look like a horse. Show a sense of proportion and detail unless you re going for a stylized cartoon look. Wireframes of models show how efficient you are as a modeler. Include low poly work if you want to get into games. Include a hard copy or video output of digital models, photographs of traditional sculptures or models, a drawing portfolio of model designs and sketches, and life drawing. Your portfolio should show you understand modeling methods, know how to build true shapes and forms, and how to use shaders and textures to add detail. An ability to paint textures is a plus. Some modelers make a reel showing their model on a turntable, revolving slowly.

Skeleton/Bones/Set up

After the character model is created as a wireframe, the model must be given a skeleton or bones. Once the skeleton is established, the limitations of movement must be specified by selecting the locations and types of joints. These selections are known as controls. Controls define the way a character s limbs or an object s parts can move. This work is done by an animation or character set up technical director (TD), (which is also sometimes called a character engineer or motion technical director). Character set up TDs work with character animators and modelers to define and create the controls that will help the animator create a realistic, convincing performance. This job requires an understanding of animation principles and strong technical problem solving skills.

Character set up TDS also program tools to create the muscle movement that happens when joints flex.

Skill set: Know how the body moves and works and know where and how the joints

rotate. Know the many types of joints such as ball and socket, hinge, saddle, pivot, etc. Understand deformation issues such as how muscles properly animate. Some companies prefer you to have experience with motion capture or motion control and data conversion experience.

Demo Reel Tips: Examples of work showing computer animation and organic modeling are important in a portfolio for this area. Show your solid understanding of anatomy and skeletal issues and your expertise in computer animation and character design.

Texturing

Texture painters help define the surface qualities of an object including colors and textures of the characters, props, and environments. Some studios may call this a render artist or a look development artist.

Texture painters create the look of more complex CG elements such as principal characters. This could include painting texture maps (e.g., color maps, specular maps, displacement maps, etc.), working with TD s to enhance the look, and creating lighting setups. This artist typically has previous production experience or has demonstrated exceptional skills/abilities in CGI/traditional artwork.

Skill set: Have a strong art background and expertise with digital paint programs such as Photoshop and experience with 3D paint applications. Understand CG lighting (ambient, specular, diffuse, bump, etc.). Some studios prefer familiarity with UNIX as well.

Portfolio Tips: Use good textures that are appropriate for the model. Show that you can create your own textures and have good judgment on how to use them. Your textures should add detail that otherwise would have to be modeled.

Animation

Animation is the creation of the illusion of motion. By displaying sequential images one after another in rapid succession items drawn or recorded on the images appear to move. Character animation is animation in which objects or characters are animated to give the illusion of personality, life, and character. Character animators use the computer to bring digital characters to life.

Computer character animators may have a background in traditional (hand drawn) or stop motion animation in addition to training in computer animation. The sensibilities and mind set of a good animator should transfer between mediums. Character animators are concerned with performance.

Skill set: Demonstrate a strong background in traditional animation and traditional character development. Character animators need to have story telling ability and

acting ability. An art background in life drawing, painting or sculpting is also helpful. Training should cover anatomy, perspective, and composition, including solving problems in weight, balance, movement, space, construction, and proportion. Artistic sensibility in the areas of modeling, lighting, and rendering is a plus. A knowledge of inverse kinematics systems, constraints and expressions is a plus, as is character animation experience with demonstrated abilities in facial animation and lip synching.

Demo Reel Tips: A video reel of animated scenes which demonstrates digital acting and performance is required. The reel should convey nuances of emotion and personality, show weight, balance, and timing. It should include basic motions like lifting, sawing, pulling, pushing, and interacting with scene elements not just running, jumping, or walking. Work should demonstrate ability to define character personality, create fluid motion, organic movement and storytelling.

Effects animators animate the non character aspects of the shot including vehicles, natural effects like water, dust, tornadoes, and hurricanes, and any other effects like lasers, explosions or bullets. Effects animators add the forces of nature to an animated film, as well as animate props, furniture, or other objects. Effects aid in producing a believable world and setting the mood for the story.

Skill set: Demonstrate expertise in the realistic creation of wind, rain, sunlight, mist, fog, shadows, and fire. In addition to having a passion for the elements of nature and particle effects animation, requirements for artists interested in this area of animation match those for a character animation artist.

Demo Reel Tips: A video reel showing a variety of effects is required. Show proficiency in modeling, lighting, particle systems, rendering and texturing.

Lighting

Lighting artists work in the 3 D environment creating the look of individual elements and entire scenes. This can include the creation of textures or the subtle use of virtual lights to enhance the mood and tone of a scene.

Skill set: Be able to light sets. Understand color, contrast, and lighting design, and be familiar with 3 D lighting. Know how lighting can be used to increase efficiency by reducing the number of elements that need to be built in a scene

Demo Tips: The most overlooked aspect of a demo, lighting should create a mood or atmosphere. Don t have over lit scenes just to show off models. Lighting should add excitement and depth to a scene. A portfolio showing video examples of 3 D lighting or traditional work, including painting, drawing, or photography, is appropriate.

Compositing/Rendering

The final step where the computer animated character is combined with the real actors

and live action plate is called compositing. The compositor is responsible for integrating multiple independent elements which could include green screen elements, 3D elements, and background plates into the final image.

It all comes together in rendering. As Terrence Masson states in his book CG 101, Rendering is the cinematography of computer graphics. Rendering is the creation of images in the computer from the modeling, lighting, texturing and animation information.

Skill set: Have a thorough understanding of color, light, film and traditional photographic techniques. Understand color difference matting. Have a strong visual sense and the ability to distinguish subtle differences that affect the matching of elements created in multiple mediums. Have an eye for color and scene match.

Demo Reel Tips: Show skill in compositing moving footage, preferably film footage, animation and live action. Include before and after shots. Other examples of work in computer graphics or traditional art mediums are also encouraged.

7 Career Tips

Once you get that job, do the very best job you can every single day.

Attitude is of paramount importance. Who would you rather work with 8 or more hours a day someone who is a positive, problem solver, eager to help or someone who complains about the work load, thinks the boss is crazy, and takes breaks every 15 minutes. The hiring manager is looking for someone who not only is capable of doing the job (has the skill), but who will fit in (has the will).

There is **no such thing as a small job**. **Do your best on every job** you get and your circle of fans will grow.

Continue to **network** and keep your resume, portfolio and demo reel up to date.

Being a **team player** is essential to keeping a job and sustaining your career. **Teamwork** is essential in any job, but especially those in computer graphics. As an artist you may be used to working independently. But when working on a project, whether it s creating visual effects for a live action film, scenes in an animated project, or developing a video game, you will be working with many other people. Collaboration is key. Teamwork, communication and cooperation is essential. Every model you create, every shot you light, every frame of film you are involved with will be worked on by someone else as well. That is why so many job descriptions include the following: Must be a highly motivated self starter, a true team player, extremely well organized and detail oriented, with the ability to take direction and follow through. Must work well with others in a high volume, fast paced environment. Flexibility and a sense of humor are a real plus. Qualities that are good for anyone in the field of computer graphics

include being self disciplined and being able to complete tasks independently. Higher positions require management skills. It s a big plus if you have a good understanding of egos and are aware of the politics involved, are diplomatic and honest, and have a high degree of integrity, and are able to handle stress.

Here are a few skills you will need for a successful career:

Work well with others: Nearly all projects require you to work as a member of a team. How you interact with others can have a significant and lasting impact on your career. Since most jobs are found through networking, make sure you are someone that people will want to work with again.

Be supportive of other team members. During life drawing sessions after work one of the artists I supervised appointed himself critic and dispensed unsolicited advice and critiques to the other artists in the room. The arrogance of the critical artist was not appreciated and the other artists did not want to work with him. Don t be a prima donna.

Don t expect to get special treatment and don t be someone who needs special treatment. If you become known as a person who is high maintenance, you will find it increasingly difficult to get hired. A person with a good reputation but little experience, talent or skills may be preferred over a person who is talented but difficult to deal with.

Listen attentively: Be a good listener. Understand what is required and if you need clarification don t be afraid to ask questions. If you are unclear about your assignment, ask the person who assigned it to you.

Follow directions and do the work that is required. If your job is to animate a model, do not redesign the model. Do not try to argue or belabor a point that has already been discussed and decided on.

Communicate well: You must be able to express your ideas clearly and succinctly both to the artist at the desk next to yours as well as to supervisors.

Contribute and Cooperate: At a video game company where I worked all the artists were expected to do all aspects of the animation process from designing characters all the way through animating and rendering those characters. One artist was adamant that he should be exempt from designing characters, that it didn t fall into his job description as animator. He was used to a studio that segmented all the jobs into well defined roles. He stubbornly refused to design characters and was soon ousted from his team. No other teams wanted to bring him on (remember how important it is to work well with others) and he soon found himself out of a job.

Demonstrate problem solving ability: What you demonstrate in your portfolio and demo reel is how you think. It illustrates not only your artistic ability but how you solve problems. Problem solving is a key skill that all employers want. Your demo reel gives

the viewer insight into your problem solving ability and how your brain works.

Complete work in Reasonable Time: Completing your job on time is essential so the other members of your team can do their jobs. Respect deadlines.

Sustain Focus on Task: Stay focused on the job at hand. If you have trouble with your scene, don t wander in the halls and bother your co workers. Seek advice from your supervisors if something is really stumping you.

Contribute to Group Discussion: When it s appropriate, such as during brain storming sessions, voice your ideas and suggestions with a plan of action and possible solution. The more you know about the project, the more you ll be able to contribute.

Be Eager to Learn: To build a successful career, you must be enthusiastic and ready to learn new skills. Techniques constantly evolve and you must be willing to try something new. That is the one constant in business change! Be flexible and adaptable.

Show Enthusiasm: Be passionate about what you do. Computer graphics requires patience both while at the workstation and also often between jobs. Love what you do and learn all you can about the history of computer graphics and animation, as well as techniques and trends. Use the time between jobs to expand your skill set and your network.

Go Beyond What is Expected: A friend who is now a character designer started as a production assistant (P.A.) on a television show. She got that first break by being persistent and keeping in touch with the production staff. Once she got that job she not only did an outstanding job in her position and never complained about the low pay, but also made herself available to others who might need extra help and put in extra hours to learn all facets of the production. When it was time to hire a new person on the crew, everyone asked that the P.A. be hired. She has the same work ethic today, a decade later, as she showed on her first job.

8 Conclusion

There is a world of opportunity in computer graphics.

There are many jobs outside the huge companies that do visual effects. Some areas where computer graphics artists work include:

music videos
games
ride films
scientific applications: NASA visualizations

product design: cars, toys, bicycles
military simulations
architectural firms
motion picture industry: posters, advertising,
movies: visual effects films, computer animated films
previsualization
television: prime time, Saturday morning, syndicated series, cable
title sequences: motion pictures or television
theme park design, themed restaurants, themed retail stores
advertising, commercials
direct to video features
training films, corporate videos, industrial films
internet: web sites
slot machines
multimedia and educational software
legal recreations
consumer products: packaging, advertising
broadcast design and motion graphics: logos, station IDs
exhibits: museums, trade shows
medical illustration
publishing and illustration: magazines,books, newspapers, comic books
animation for mobile phones

There is no single way to get in.

Your most important marketing tool is your reputation. Make sure it is stellar! and don t burn any bridges.

Design your marketing materials (the resume and demo reel) to reflect your strengths.

Whether you submit a demo reel or portfolio, remember to always include a resume and breakdown with it. Have others take a look at them and give you feedback before you send them out.

The resume, portfolio and demo reel are marketing materials prepare them with care. Remember, the purpose of your marketing materials are to get you an interview with someone who can hire you.

An interviewer is trying to discover three things:
1) Can you do the job?
Your demo reel, job experience and education show the talent and skill level you have and helps answer that question.
2) Will you do the job?
The can do attitude and enthusiasm you portray during the interview demonstrates a willingness to do the job.
3) Will you fit in?

All the research you have done on the industry and the company and the people you interview with shows that you are one of the team ready to be part of their team.

Update your skills. Sign up for classes, seminars, conferences and attend user group meetings. Find internet discussion groups where you can post your work for feedback. Anyone working in the visual effects, computer graphics and animation industry knows that learning is an ongoing process. You can t grow in your career unless you learn, so do your homework!

Maintain a positive, problem solving attitude and professional approach on every job you have and build your network, and it s likely you will have a long, successful career.

Recommended Reading:

The Perfect Resume by Tom Jackson is a great guide to creating a resume that will work for you. The library will probably have a copy (650.14 J138p 1990)

CG 101 by Terrence Masson, published by New Riders, 1999, gives an overview of CG.

The Illusion of Life: Disney Animation by Frank Thomas and Ollie Johnston, Abbeville Press, 1981, is like a course on animation by two of Disney s Nine Old Men.

Producing Animation by Catherine Winder and Zahra Dowlatabadi, Focal Press, gives a fabulous producer s overview of the animation process. But Producing Animation is not just for producers. Anyone who works in or aspires to work in animation would benefit from Producing Animation. The writers are both experienced production people and remind us how important attitude is and why it s essential to establish a sense of mutual respect for everyone involved on a project.

Get the Job You Want in Computer Graphics
Getting a Job as a Technical Director / Software Engineer

Fran Zandonella, CEO, Fran Zandonella Consulting, has programmed tools and supported artists working in 3D, 2D, films, commercials, and shorts at LAIKA, Inc and Disney Feature Animation. She has worked in both Software / Research and Development, and Systems. In her time in the animation industry, she has written user interfaces, created tools for other software departments, evaluated new software, written documentation, performed light system administration and hardware administration duties, and managed render farms.

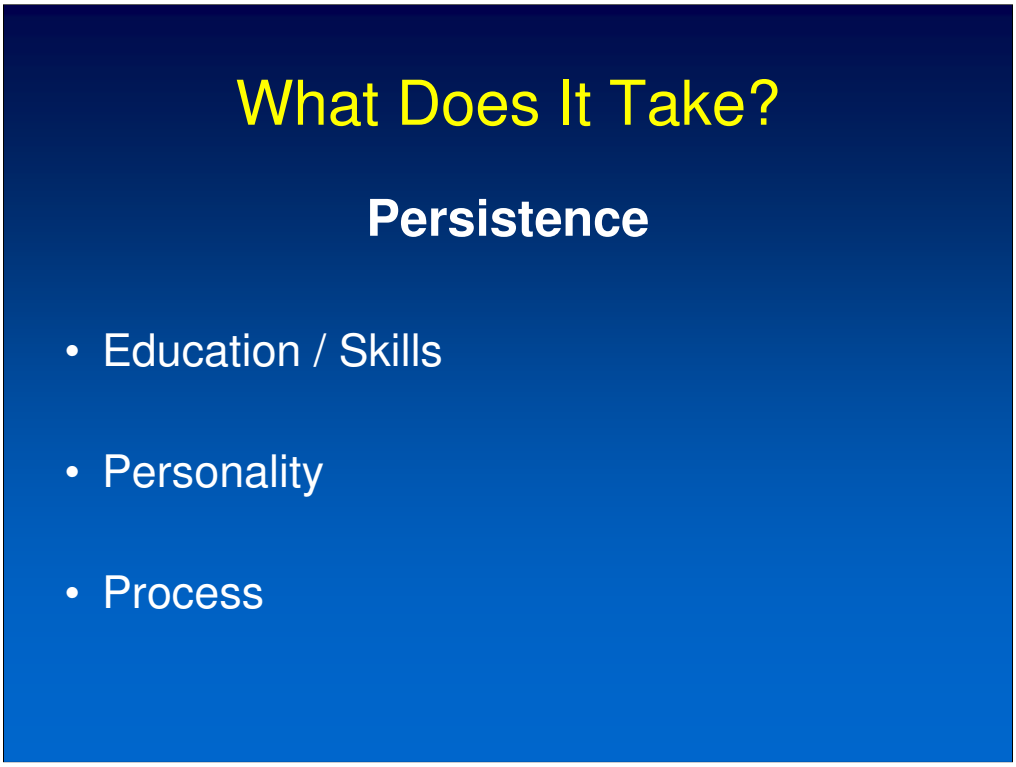
Get the Job You Want in Computer Graphics

Getting a Job as a Technical Director / Software Engineer

Fran R. Zandonella

Get the Job You Want in Computer Graphics
Getting a Job as a Technical Director / Software Engineer

earn how to get a job as a technical director or software engineer in the computer graphics field, specifically in the animation and effects industries. This course reveals the education, skills, and self knowledge required to become a TD or Software Engineer, as well as the process to obtain and succeed in those careers.



1. What Does It Take?

What does it take to get a technical job in Computer Graphics?

How do you get your foot in the door? How can you advance in your career?

Persistence – aka passion, tenacity, stick-to-it-tiveness, focus

No "stopping for a lollypop"! The people in this industry are driven, intense,

fun-loving folks. It takes these qualities to be an excellent technical person in this field.

Note: Many people apply, but only 1 – 2 percent get hired.

Education and Skills

Most technical positions in computer graphics require at least a Bachelor's degree in Computer Science, Engineering, Physics or Math. Some positions require PhD's. If you don't have a degree, it is not impossible, but you will need to demonstrate that you can do the work via a demo reel, selling your own software, writing software for an open source project, or creating software that is available via an online forum, for example at the highend3d website.

For example: During the time I worked at Disney Animation, one third of the software department had PhD's, one third had Master's degrees, and one third had Bachelor's degrees. Other companies I have worked for only required Bachelor's degrees, but having a Masters in CG helps.

Personality

Most tech folk in CG are "geeky." "Geeks" or "Nerds" like to solve problems, build things, and generally be technically creative. If you fit in the group, it is more likely that you will be able to get that job and that you will enjoy the job.

Process

In many regards, the process for getting a job in CG is the same as for any field. Here are some particulars about this field.

CG is a small and sexy industry. This means there is more competition to get in. Be prepared to fight for your job. Be prepared to work hard to get this job, and prepared to work hard to keep your job.

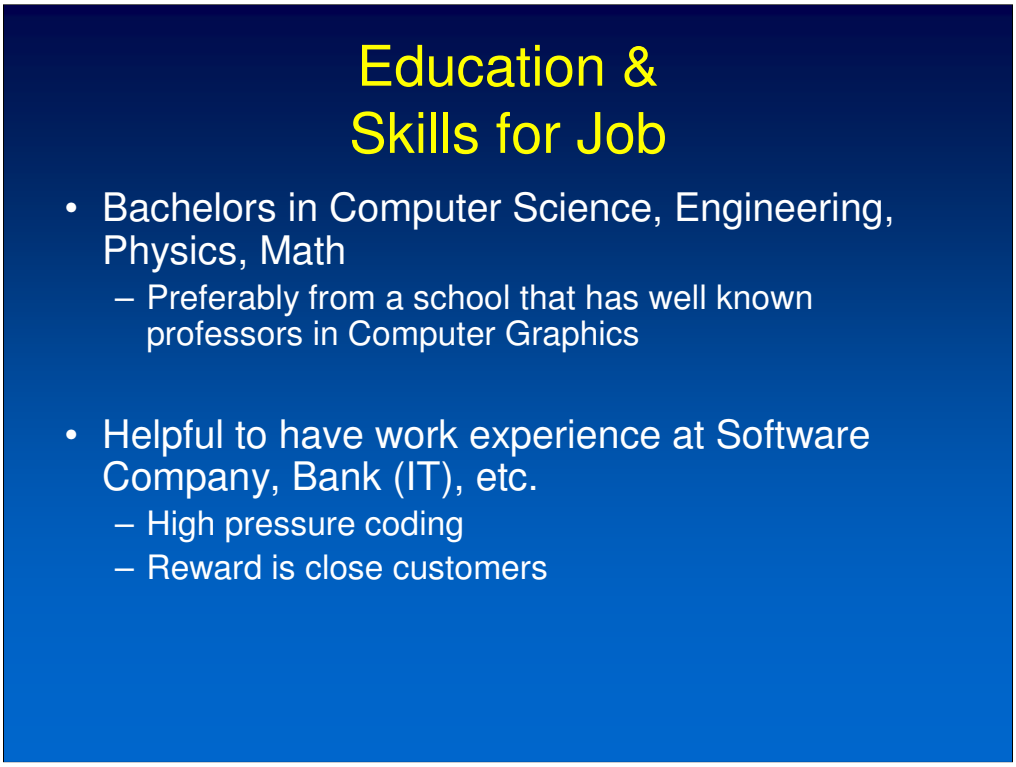
For example, I had to work the day after Thanksgiving. The studio was mostly empty, but one of my co-workers wandered in around 1pm. He happily told me that he'd been working on his software until 2am on Thanksgiving. Talk about dedication!

2. Work Arenas

The Computer Graphics industry spans a wide range of disciplines. The main areas are Gaming, Animation / Visual EFX, and Scientific Visualization.

Many other fields require graphics, so there are more work arenas than I will mention here. There are some other major fields like Photography, Virtual Reality, or Hardware.

Be sure to investigate areas you may not have thought about, like law. awyers need animations and graphic examples to explain their complex case to the jurors.



3. Education & Skills for the Job

Before I tell you HOW to get the job, I'm going to talk about WHO will get the job. Some of the skills needed to get the job will be used at work in the job.

Education It is best to have a degree, preferably from a well-known school for computer graphics like Stanford, MIT, Carnegie Melon, University of Utah, University of Washington, or University of North Carolina. Note, this is not an exhaustive list. Depending your area of interest, it may be helpful to have a PhD in CG, Physics, or Math.

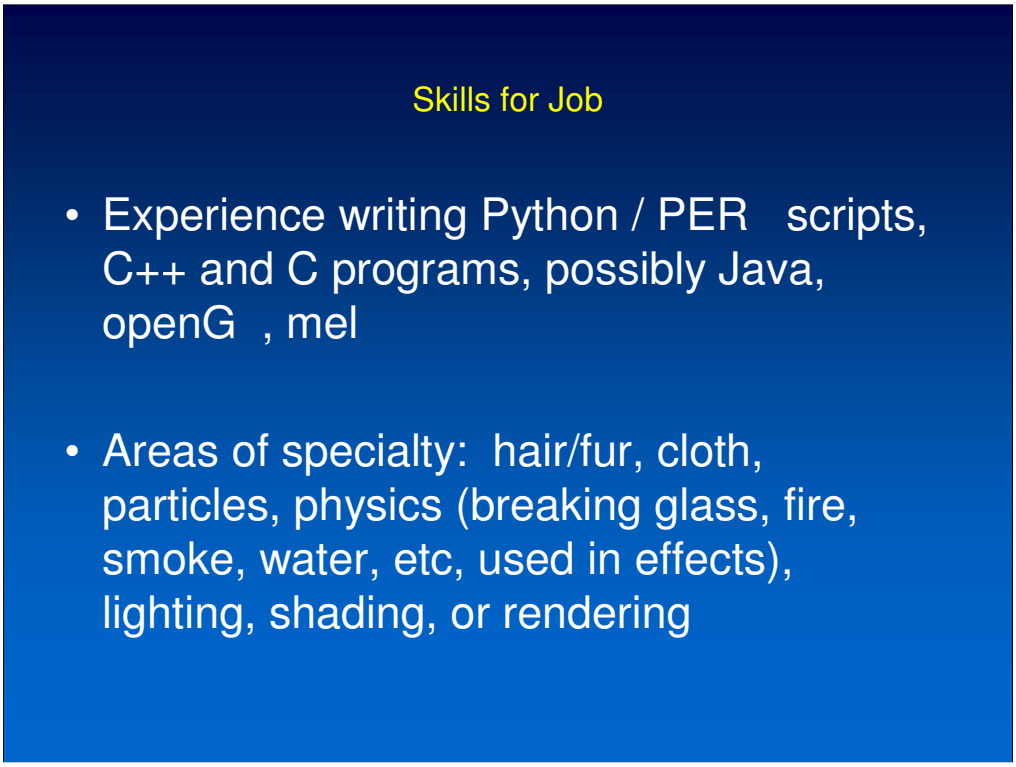
For example, understanding physics and math will help you model water, waves, dust or smoke.

Art schools with an technical focus are also good places to get degrees. These schools include places like the Savannah College of Art and Design, Academy of Art in San Francisco, Gnomon or Cal Arts in A, etc.

Skills

Just Out of School If you are just getting out of school, pursue an internship. If the company doesn't have an internship program, see if you can convince them to create one for you. Find someone there to become your mentor. Be persistent.

Out of School If you didn't go the internship route, make sure that you are currently working in a company that provides an environment with high pressure coding, and close contact with customers. In the CG industry, your customers are often as close as the next "pod" or room down the hall. Programs are often needed quickly, as production demands a quick turn-around. Visual EFX requires more speed than animation due to its tight production schedules. Solving the problem and putting the images on the screen are more important than a "perfect" program.



Skills for the Job (continued)

Get experience coding in Python, PER , C++/C, openG and mel. Java is also good to know, but not required as much. earn more than one platform: inux, Windows, and Mac OSX. Most studios use more than one platform, and most of the major studios have standardized on inux.

Specializing

Consider specializing in hair/fur, cloth, particles, physics (breaking glass, fire, smoke, water, etc, used in effects), lighting, shading, or rendering. Shader writers often make six figures, sometimes around $200,000 / year.

Skills for the Job (continued)

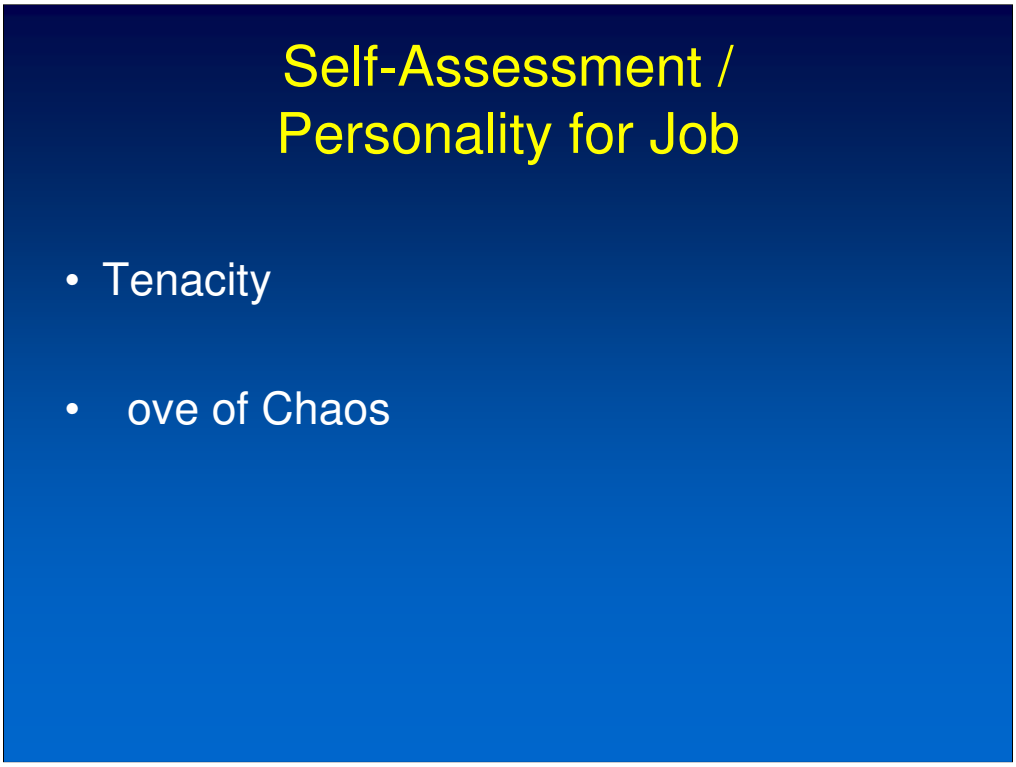
3rd Party Applications

earn 3rd party applications: Maya, XSI, 3dsmax, Mental Ray, RenderMan, Shake, Houdini, and After Effects.

Maya has a fantastic student discount, and Houdini offers free classes in os Angeles. Take a class at your local college to learn the software.

Competitive

Always keep your skills sharp, and be prepared to fight for the cool graphics tasks, even if you have a Ph.D. Even a Ph.D. dissertation in the subject is no guarantee that you will get that assignment.



4. Self-Assessment / Personality for Job

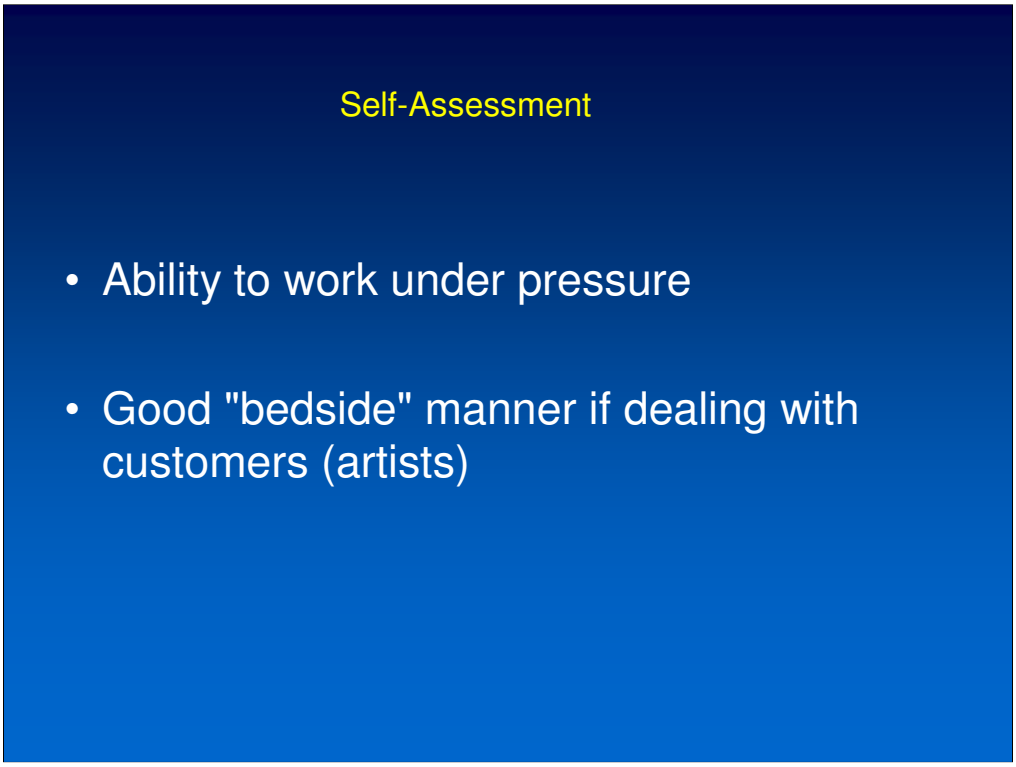
Personality is key in getting the job and keeping it.

Tenacity / **passion** / **persistence** / **focus** is required both in the job, and to get the job. Projects may go beyond one or two years, or your software may become popular and "sticky" (meaning that you will have a hard time moving away from that software and onto other projects).

For example, it took me at least 3 years to break into the industry. The same is true for many of my friends. Some days, few companies are hiring due to something like actor or writer strikes. Other times, a big project comes into town and every studio is hiring for it, and there are lots of jobs. Keeping your skills sharp, and keeping in touch with your contacts will lead you to the job. Be prepared for opportunity's knock.

ove of Chaos

Both the movie and gaming industries are vibrant and chaotic. Both the environment and the life-styles are chaotic. Are you ready to spend time unemployed? Ready to work long hours on moment's notice?



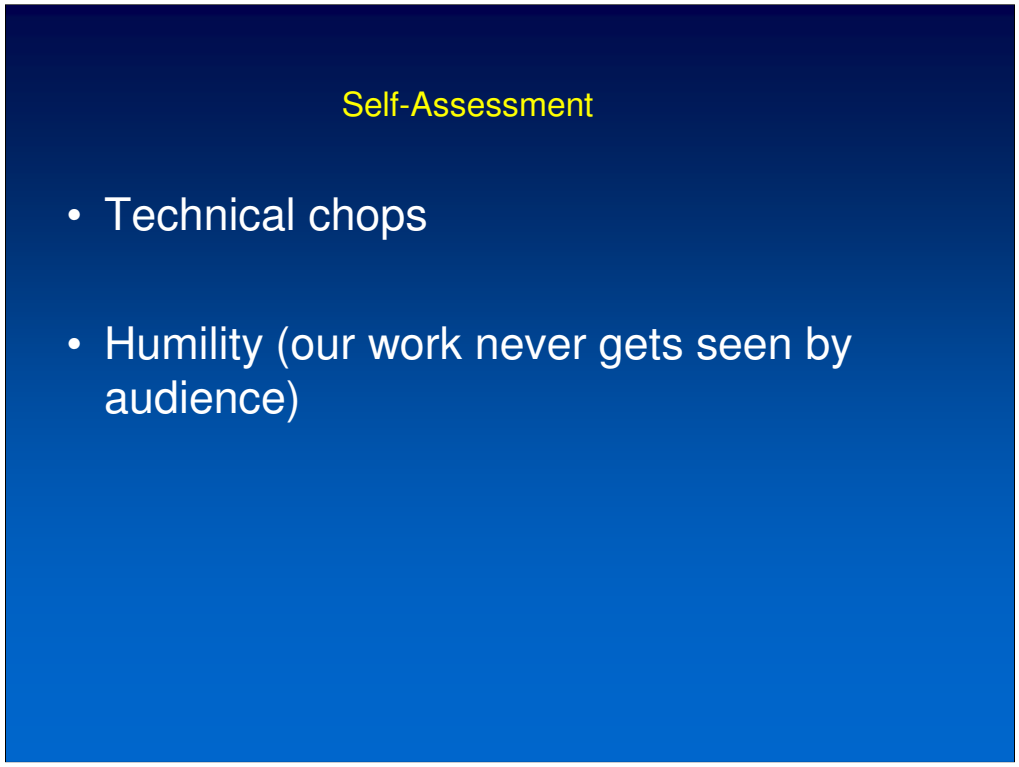
Self-Assessment (continued)

Work Under Pressure

Both the gaming and movie industry are episodic and periodic. In games, “crunch time” comes during the summer and very early fall in order to get the games into the stores in time for Christmas. Movie “crunch time” occurs in the winter and early spring for June movie releases, or late summer and fall for November movie release.

Good service

In the movie industry, the tech folk serve the artists, who are the “rock stars” of the industry. As the gaming industry is more tech heavy, many of your customers are just like you – your teammates and fellow gamers.



Self-Assessment (continued)

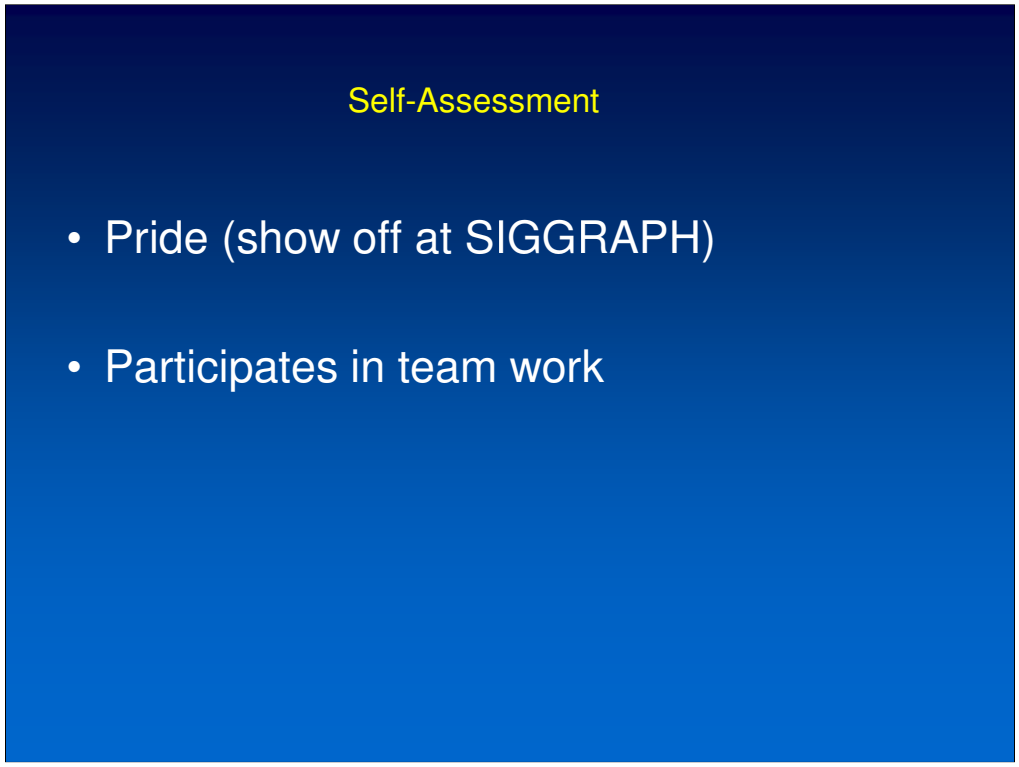
Technical Chops

You need to have the technical skills to do the job. Programming skills, understanding object oriented programming, writing design specs, writing good bug reports and resolutions, and communicating with the documentation specialists as well as your team are all critical to success.

Humility

In this industry, most of the public will never know the work you do. Our only public exposure is at SIGGRAPH and like conferences. We may do the coolest things, but the role we play is the Wizard Behind the Curtain.

During the time I was at Disney, I fixed many problems for artists: rescued their artwork, got everyone back up and running from a down time when the artists were on double time, fixed messed up and missing frames of the films. I removed Vikings from shots where they weren't supposed to be in the movie *tlantis,* and made *Tarzan* surf nicely through the trees. I created tools for artists to create amazing art. However, you won't see any of my work when you watch *tlantis* or *Tarzan*. The artists appreciated my work, but the public will never see it.



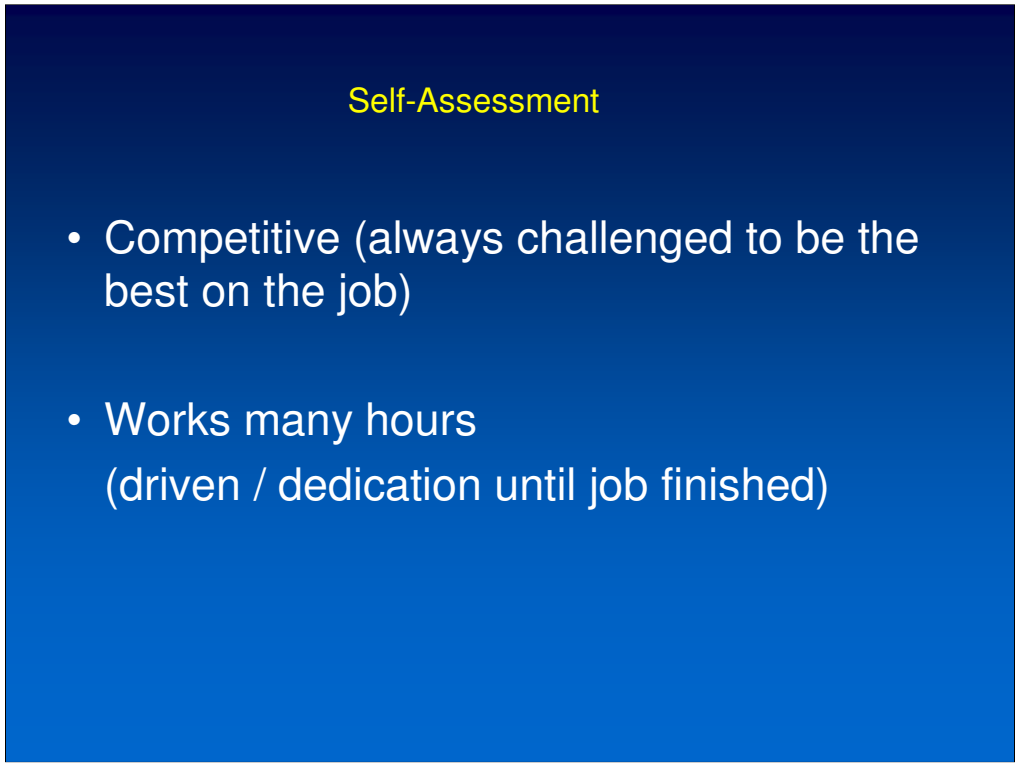
Self-Assessment (continued)

Pride

As a group, software engineers do take pride in our work, and get to show off to others “in the know” at SIGGRAPH and other technical conferences like the Gamer Developer’s Conference. In film, it is possible to win a Scientific Academy Award for ground-breaking innovations in the science and technology of film.

Team Work

This field is very team-work oriented. There is not too much opportunity to be a loner. A movie or game doesn’t often get done by one person alone these days. Make sure you have good communication skills. earn your communication style. (There are a lot of resources to learn about your style online.) Be professional and friendly with your colleagues.



Self-Assessment (continued)

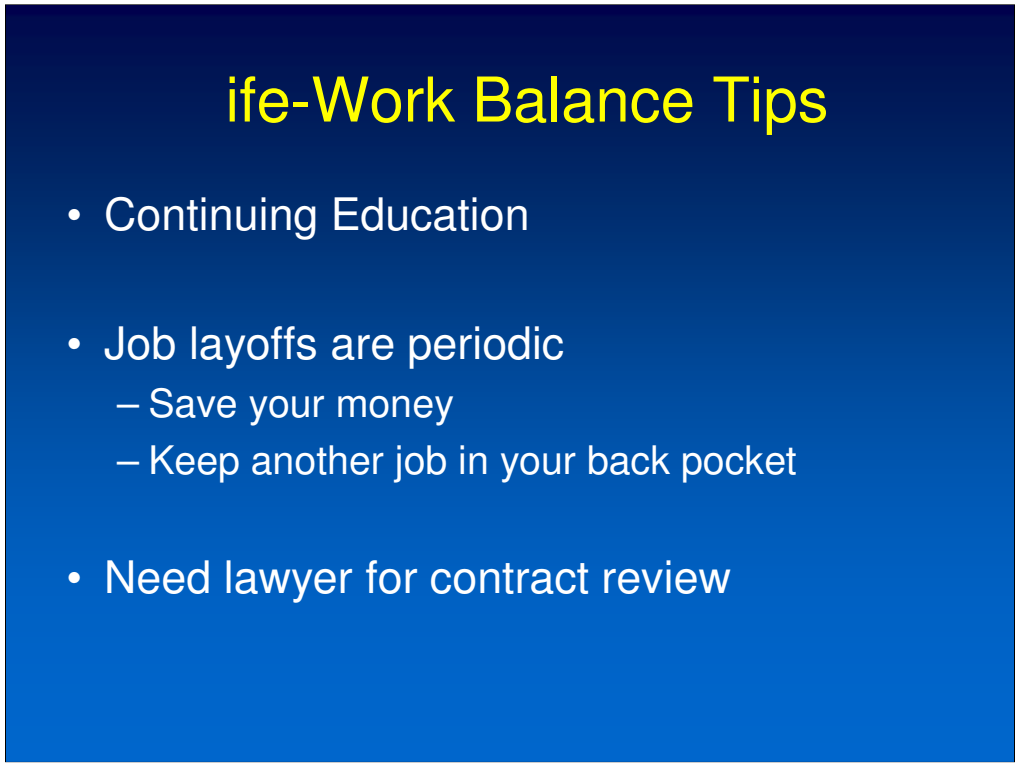
Competitive

Make sure that your technical skills are the best that they can be. There are many smart and hardworking people who want to get into this field. You need to keep your tech skills competitive.

ong Hours

Be prepared to work a lot of long hours – whatever it takes until the job is finished.

During "crunch time," many people put in 12 hour or longer days. "Crunch time" can be as short as a month, or as long as 6 months. The days are often fun and busy, and companies will often pay for meals during crunch. In the past some companies have even had hairstylists on-site, and provided laundry pick up.



5. ife-Work Balance Tips

There is a lot of talk these days in our industry about ife-Work Balance. Some tips to help you maintain it are:

Continuing Education

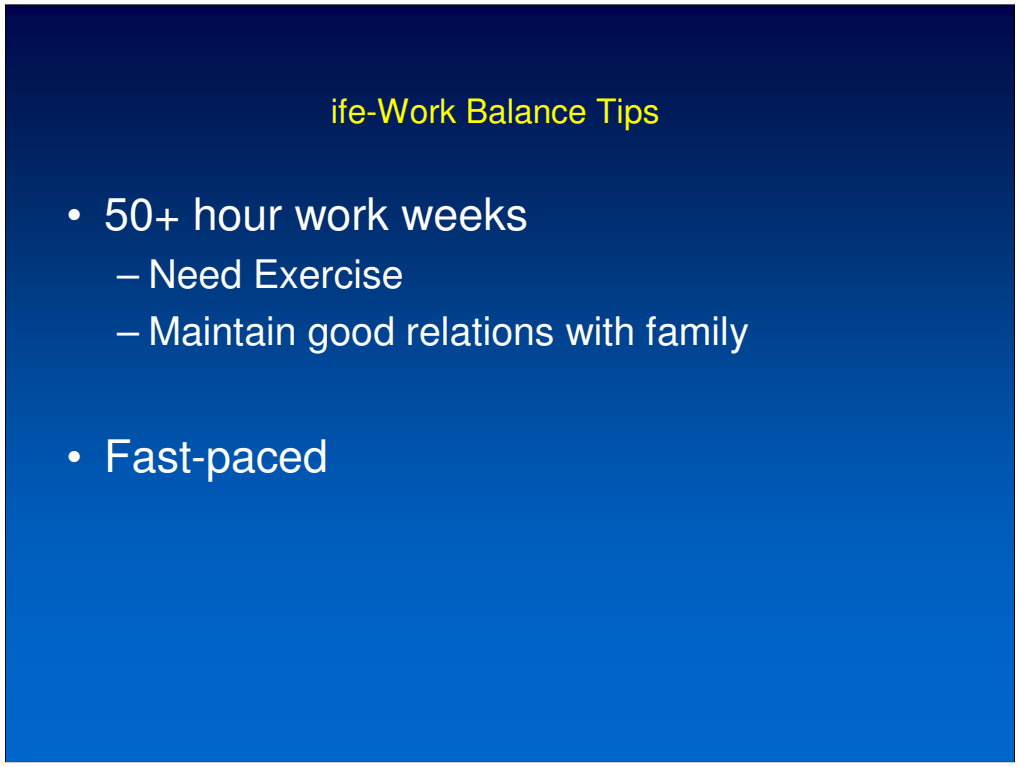
Always set aside time and money for continuing education. Some companies help with this, but many do not, or your boss may not. Don't wait for someone to offer it, pursue it on your own. Bring new knowledge into the company.

Job ayoffs

Be prepared for periods of unemployment. Some people save up when they are working and travel when they are not. I recommend studying something else that you can "flip over" into until the market picks back up. Software engineers usually are not tied to a production, though in gaming they may be tied to a game. Both gaming and film and periodic, and the computer industry itself is periodic, so be prepared to be unemployed, even if you have superior skills.

Contract Review

Some companies in the industry require you to sign a contract. It is good to know a contract lawyer who can review such contracts to protect your rights.



ife-Work Balance Tips (continued)

ong Hours

Keep Fit

I've mentioned it before: We work hard. Some companies have a 50 hour work week. During a production "crunch," we work a lot of hours. Remember to exercise. This keeps your brain in top shape, and keeps you healthy. Sitting for long times at the computer can be hard on your body. Move it!

Maintain Relationships

Pay attention to your personal life. Make arrangements so your family remembers who you are.

Fast-paced

This industry is fast-paced. Technology changes rapidly. Remember to take time out to breathe, take breaks, and vacations! Take care of yourself so you don't get carpal tunnel, or back problems. If you have a physical problem or get sick, it might keep you away from work longer than a vacation.

6. How to Get an Internship

Benefits

The benefits of getting an internship are:

Gaining first-hand knowledge of the industry and types of jobs in it. Acquiring a mentor and developing a network of contacts. Discovering whether you like the job/industry, and discovering your strengths and talents.

Ask!

Ask for the internship. Go out onto the Expo floor and ask each company you are interested in if they have an internship program. If they do, get the info for it, or get the contact info for a person to speak to about it. Check the websites of the companies that you are interested in. Call the company receptionist and ask about programs. If they don't have one, see if you can speak to a manager. At one of my old companies, we got an intern because he came to our office and gave the receptionist his resume. The manager was impressed by his motivation, his skills were OK, and we put him to work.

Types of internships

Some companies have internship programs, and they may be elaborate, or very simple. Start by looking on websites, or attending any orientations that your college may host. If a speaker from a particular company comes to your school, ask him or her about internship programs.

Design your own internship

If the company does not have an internship program, ask to design your own. The young man I mentioned earlier offered to work for free. (Generally, I don't recommend that people work for free in this industry, but it did work for that young man.)

Be polite, and persistent.

Pros of an Internship

Find a Mentor

Even if you are assigned a mentor, find someone who shares your interests and learn from them. If you are interested in color science, find the person at that company that does that work and take them out to lunch.

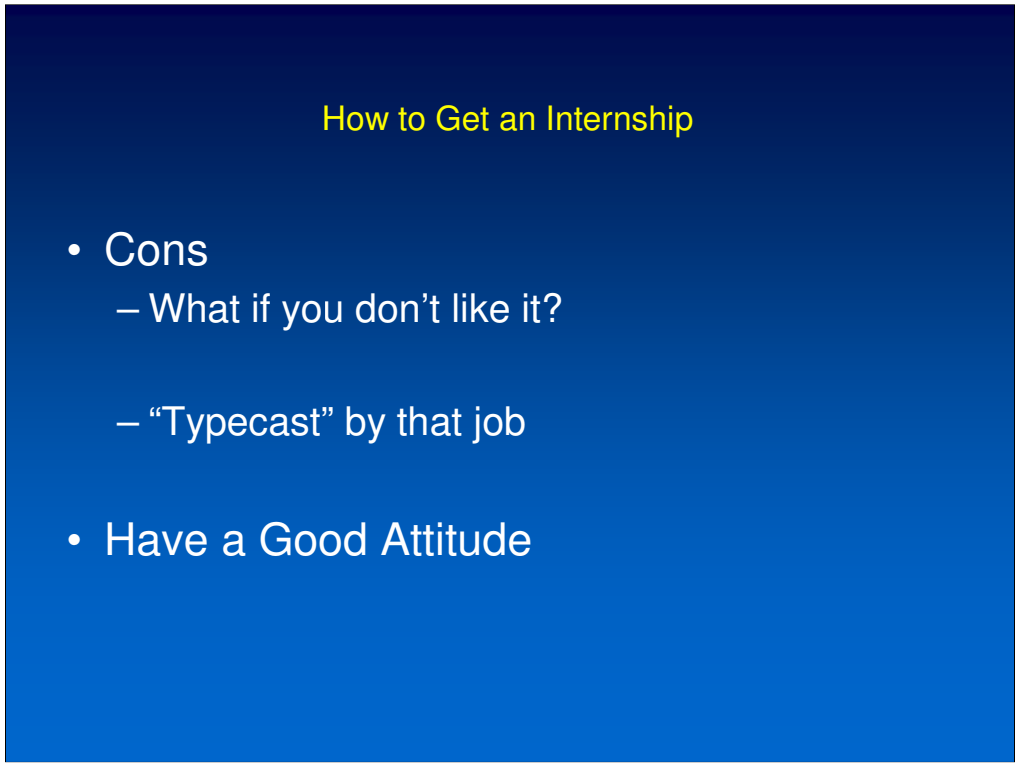
Make Connections

Make friends with the employees at your company, and then continue to keep in touch. People move around, and that person may remember you fondly when they are at their next company.

Get Recommendations

Before your internship ends, get recommendations from your boss and/or co-workers.

If you do a good job, you might get hired at that company.



Cons of an Internship

What if you don't like it?

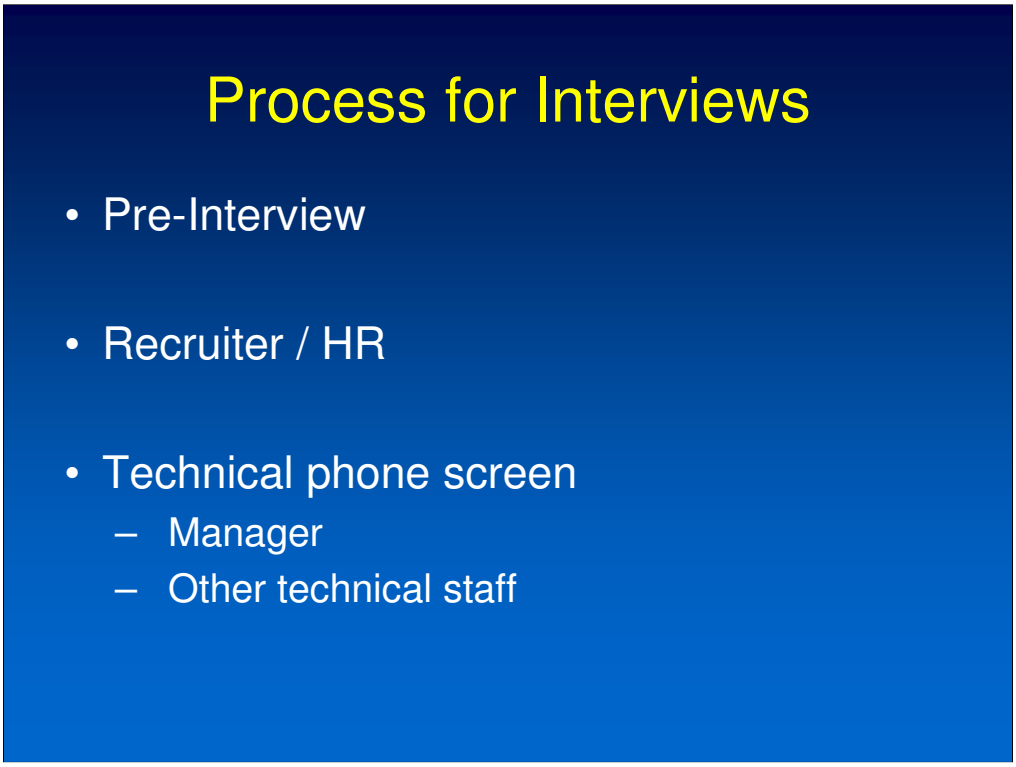
Then you have learned something about yourself and the industry. Take time to reflect and refocus your interests and energy.

Typecast in a Job

If you find yourself typecast in a role you don't like, you will need to work harder to change your focus. Take it as a learning experience. ook for what transfers from the previous position and use that to push you towards the job you are interested in. Study more in areas unrelated to the job you didn't like.

Have a Good Attitude

People want to hang out with someone who is "cool" and "fun." Even if life is getting you down, don't get others down. Be the person that everyone wants to have on their team. Become the "go to" person on a project.



7. Process for Interviews

The process for interviews is similar whether it is for a regular, full-time job, or for an internship.

Pre-Interview Do all the things Pam told you about in her part of the talk.

Research the company and find out what the pay range is for that type of job. There are websites that do salary surveys. Ask people who work at that company who do the job you are interested in what the general pay range is. Don't ask them how much they make because most people find it rude. Know what you are worth.

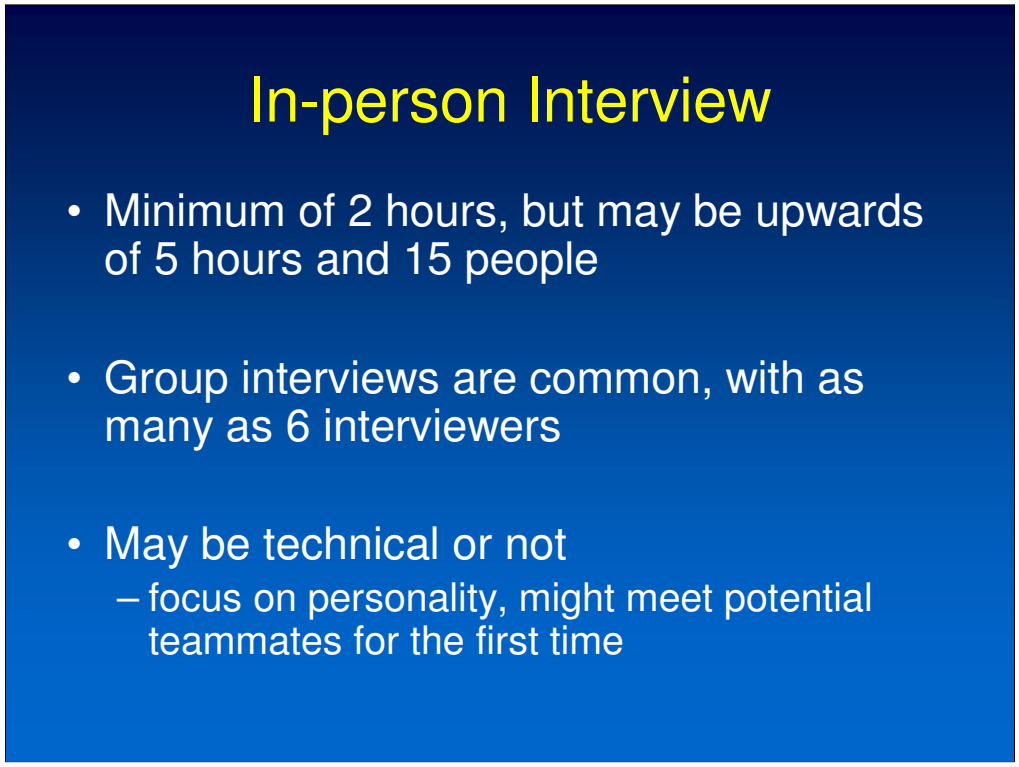
Recruiter / HR

At the beginning, you may contact or be contacted by a recruiter. The recruiters job is to find as many qualified people as possible to give to the hiring manager. Their job is both screen out people who don't fit the criteria as well as attract the people who do fit the criteria. HR may give you a basic phone screen to see if you generally are the type of person they will hire. These interviews are often not very technical.

Technical phone screen

After the recruiter or HR person passes your resume to the hiring manager, and you meet the criteria, you will receive a technical phone screen from the hiring manager or some members of the technical staff who have been tasked with finding out if you have the technical chops.

The technical phone screen will last between half hour and an hour. You may also be emailed a timed "test" which would include writing some example code.



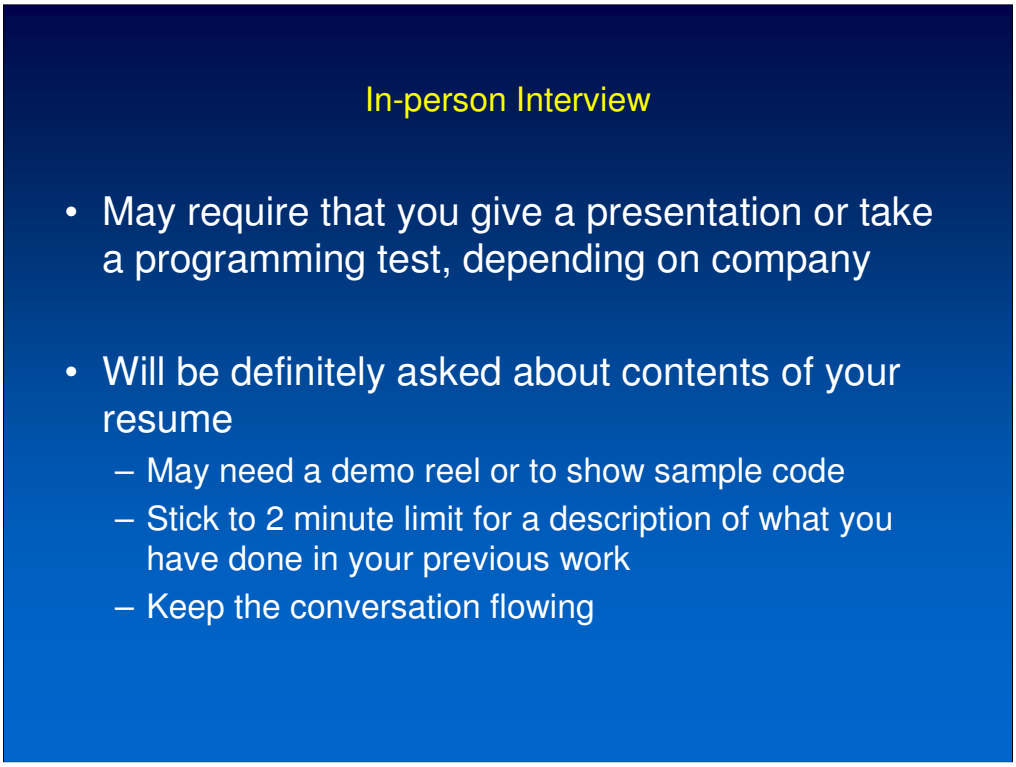
In-person interview

If you pass the phone screen, and are a strong candidate, the company will bring you in for an in-person interview.

Before interviewing, ask HR for a list of the people with whom you will be interviewing. Get this list at least one day ahead of the interview, and google the interviewers. That may lead to some good questions for you to ask them.

For example, I've worked with several Academy Award winners who won technical awards for their innovations. It is interesting (and flattering to the interviewer) to ask them about what they did to win the award.

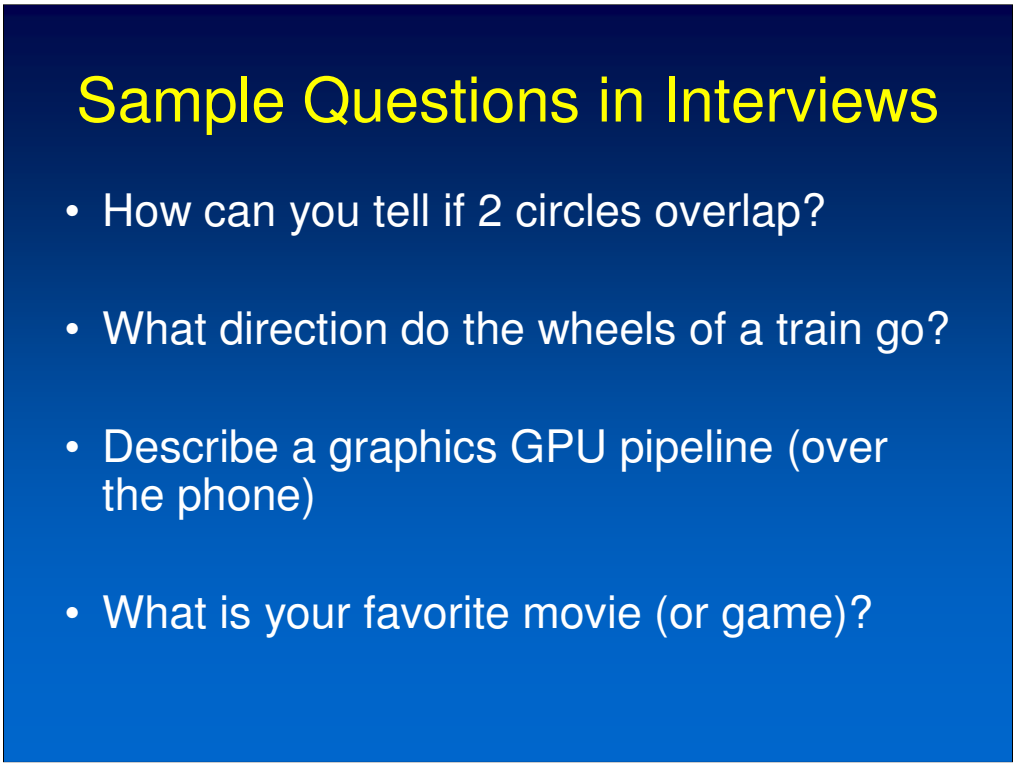
At one company I worked for, our entire team of 6 people interviewed each candidate in a small conference room. All that was missing was the bright lights and water dripping in the background!



In-person interview (continued)

I've put a link to some good suggestions on how to perform on a programming test at the end of these slides.

Be prepared to talk about your interview, but don't talk for too long (more than approximately 2 minutes) or hog the conversation.



Sample Questions in Interviews

These are questions that the interviewer from the company is asking you at the interview.

These are actual questions I have been asked at interviews.

How can you tell if 2 circles overlap?

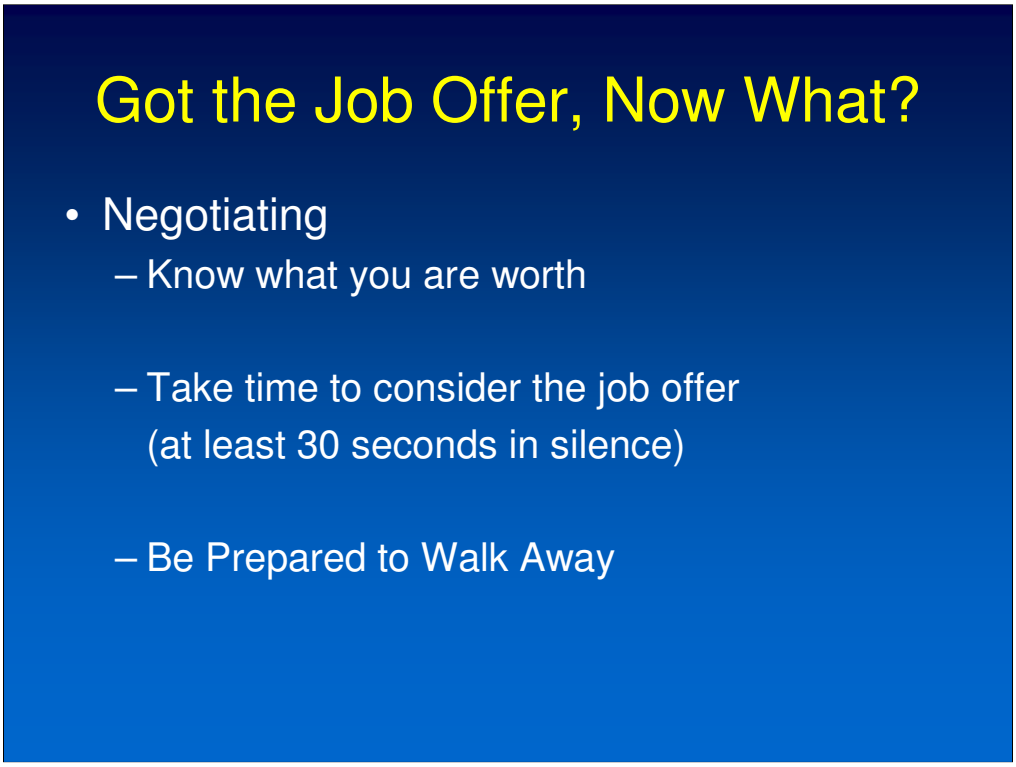
What direction do the wheels of a train go?

Describe a graphics GPU pipeline. (asked over the phone)

What is your favorite movie (or game)?

I honestly didn't have a good answer for this one because I wasn't expecting it.

There are more sample questions at the end of this presentation, as well as a link to some of the types of questions you might be asked at a Google interview.



8. Got the Job Offer, Now What?

Negotiating

When you have the verbal offer but haven't started yet, that is when you are at the strongest negotiating point. Stan will be covering this in more detail, so I'll just say a few things.

Know what you are worth.

This is where your research comes in handy from before your job interview.

Take time to consider the job offer.

At a minimum, take 30 seconds in silence. Ask them, "Is this your best offer?" Ask them if you can take 24 hours to respond to the offer. Discuss with family and close friends. If you feel the offer is too low, try to convince them to pay you more by reiterating your skills, the average salary (from the research that you did), or ask if you can have a salary review after 6 months on the job. If the offer is too high, make sure you understand what the job entails and that you can perform that job.

Be Prepared to Walk way

This is probably not the only job offer you will get. If it is not the right job offer, don't feel guilty about walking away.

Before You Start the New Job

Find out as much about the job as you can before you start. Get familiar with the computer languages and systems they are using, the 3rd party software they are using, and the general process of how the department works. You can ask the manager about this, or ask a future co-worker (who perhaps interviewed you). Be sure to also ask them about your new city if you are relocating.

9. The First 3 Months

Take care of yourself!

Relocation can be disturbing, so remember to exercise and eat right.

Seek a Mentor

And reconnect with former mentors who can help you with your transition into a new job. These are people you can go to for advice about the new company, or new responsibilities of your job.

Keep Work Hours Sane

While you may need to put in a few extra hours learning your new job, pace yourself and pay attention to the rest of your life, too. Maintain balance.

The First 3 Months (continued)

Set Expectations with Your Boss

Don't rely on your boss to reach out to you. Take initiative to make the relationship work.

Clarify expectations early and often. earn your boss's style: what type of communication does he or she like? What constitutes success in your boss's mind?

Don't get caught up in firefighting. Take time to understand the players: your boss, your team, and your customers (artists).

The First 3 Months (continued) / Set Expectations with Your Boss (continued)

Make your boss look good, no matter what. Find out what is important to your boss and why, and then go code solutions, or negotiate solutions to those problems. Meet or beat your quotas or milestones.

Get to know the teams (software engineers, production staff, other Technical Directors) who can help you out in a crunch. Find out what deadlines are looming, and what is important to the smooth release of the movie, game, or software. Find out who has influence with your department. Directors are God. Others to know are producers, department leads, and influential or senior artists.

Understand how your work is measured (milestones or quotas). Companies desire a quick turn-around in your work. Speedy completion of the work is money in the bank to them. Don't sacrifice quality, but be efficient and avoid superfluous (and unappreciated) work. Find out what the project or shot turn-around time is for senior people, and for the average junior person. Aim for a faster turn-around time than the average junior person. Find out how the senior people quickly get their work done. (What corners are they cutting? What speeds up their process?)

On one of my software projects, my co-worker came up with a brilliant and fun idea of automatically coloring some ink lines. He was so entranced with the idea that he immediately implemented it before we even spoke with the artists. When we spoke with the artists to get the requirements specifications, the artists mentioned that they didn't need that tool. They needed something completely different! Doh!

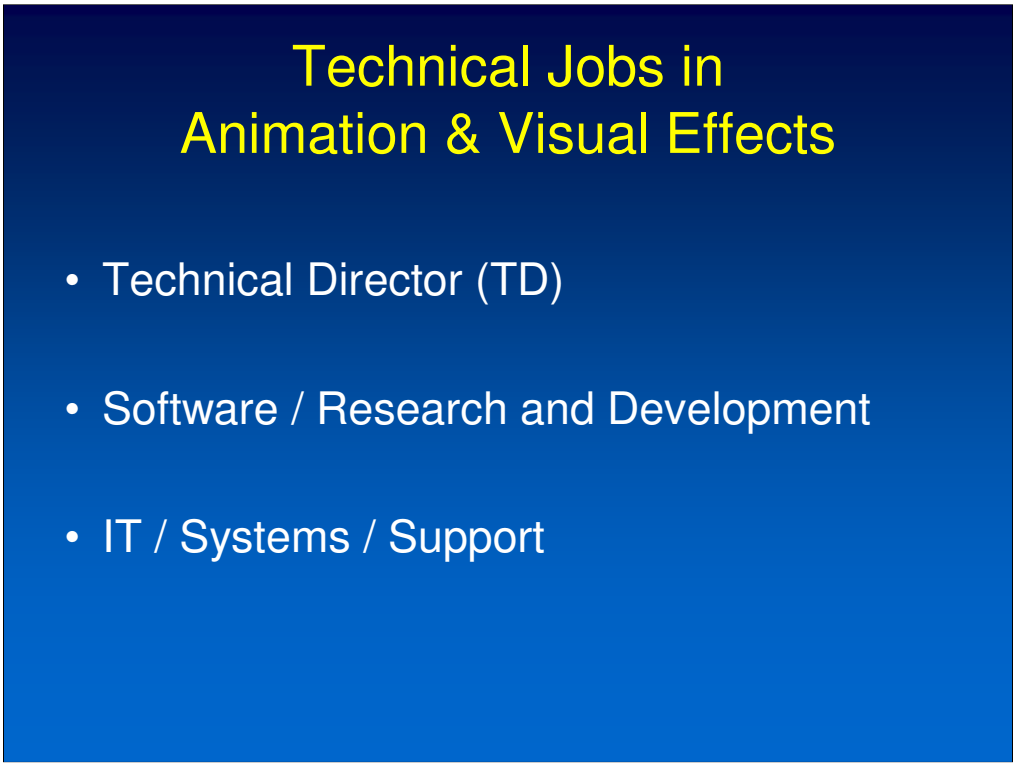
The First 3 Months (continued)

Set Expectations with Your Boss (continued)

Ask to be seated near people who share your work. These people can help you when you have questions, and you can learn by observing them work.

Ask for a mentor. Ask to be set up with someone who can help you get started. Collect up your questions (to minimize interruptions) and ask questions of how to do things at that company and where to go for resources.

After 3 months, find a new boss if needed. Not every boss is good, and not every boss is good for you. If your boss sucks, find a new one. Successful people serve on great teams with great bosses. Know yourself and focus on your strengths.



10. Technical Jobs in Animation and Visual Effects

The most common technical jobs are:

Technical Directors (TD)

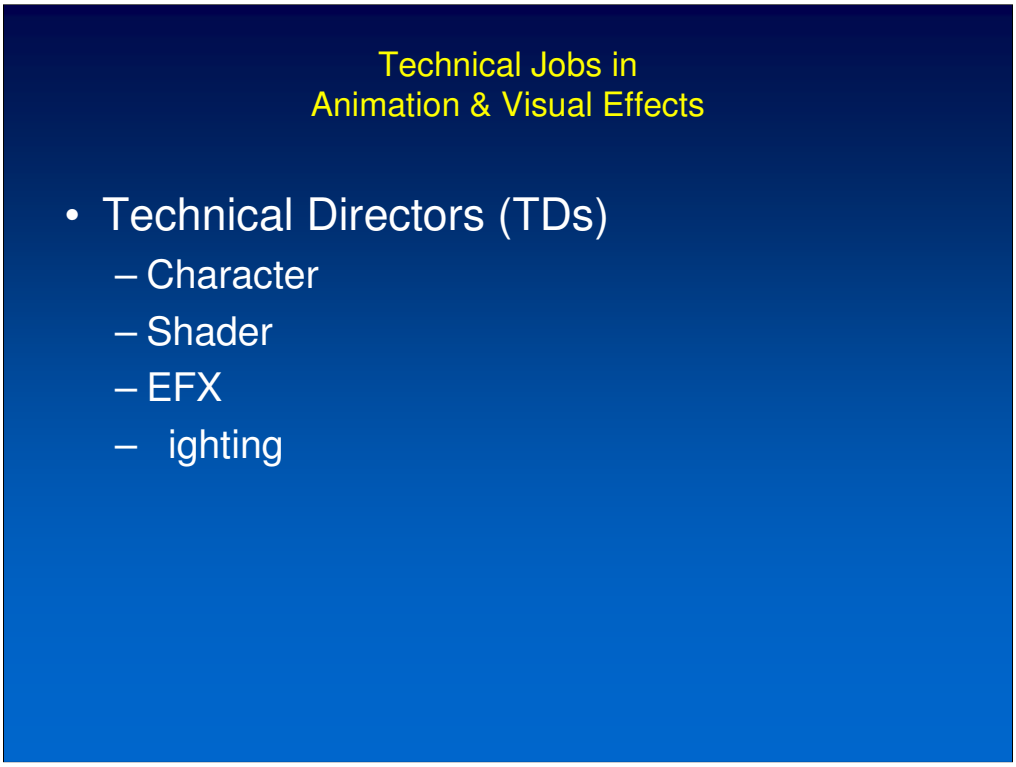
TD's perform technical or artistic work on shows or productions, sometimes within or across productions.

Software Engineers / Research and Development TD

Software or R&D folks write code and create technical solutions across a show or across the company.

IT / Systems Engineer / Support Engineer

IT generally works across the company, so it will encompass all work within the facility, both business and artistic.



Technical Directors (TDs)

Provide technical solutions for a particular department. This may involve coding plugins in C/C++, writing scripts (PER , Python), or set up for shots or expediting images through the pipeline. For some departments (example: Animation), the job focuses on writing tools for that department and non-technical artists. In other departments (example: EFX, Shader), the TD may create artwork for the shot in addition to writing tools.

Character: Animation / Rigging

Creates tools for the animators to make the characters perform.

Shader

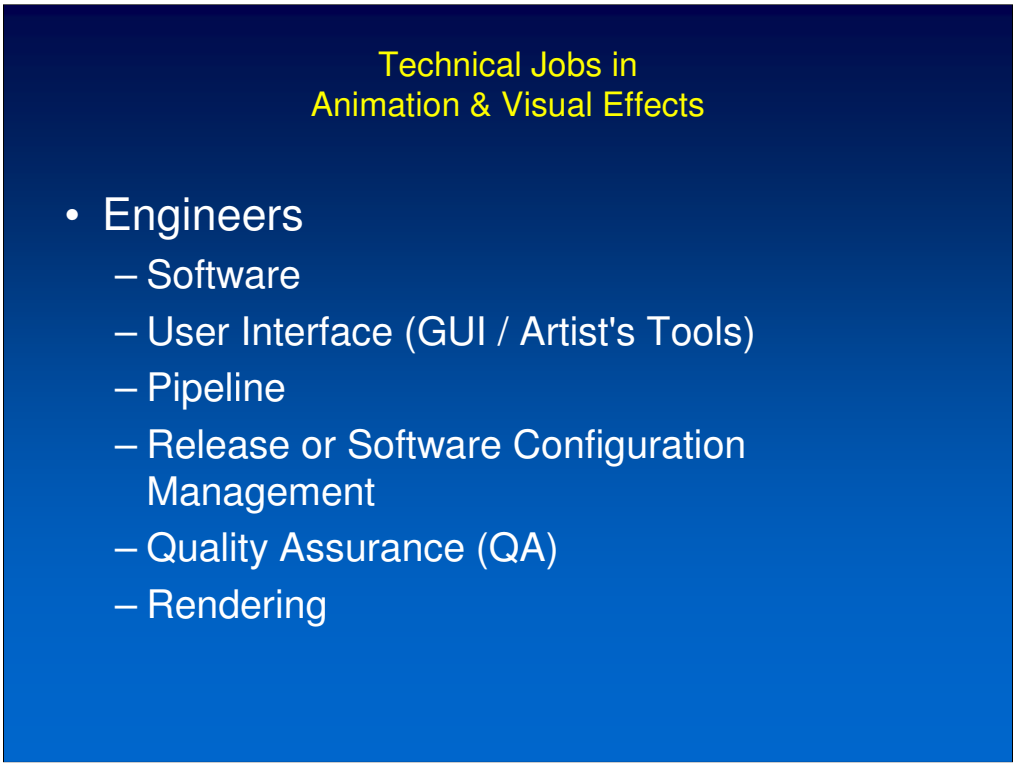
Creates the “look and feel” of the character and other objects, for example: realistic-looking skin, or fur under different lighting conditions

EFX

Creates an effect, like explosion, fire, smoke, water. This may be done artistically or programmatically, or both (think “art-directed water”).

ighting

Creates lighting environment for entire show. ighting interacts with everything in the shot. Solutions may be artistic or technical.



Engineers

Software

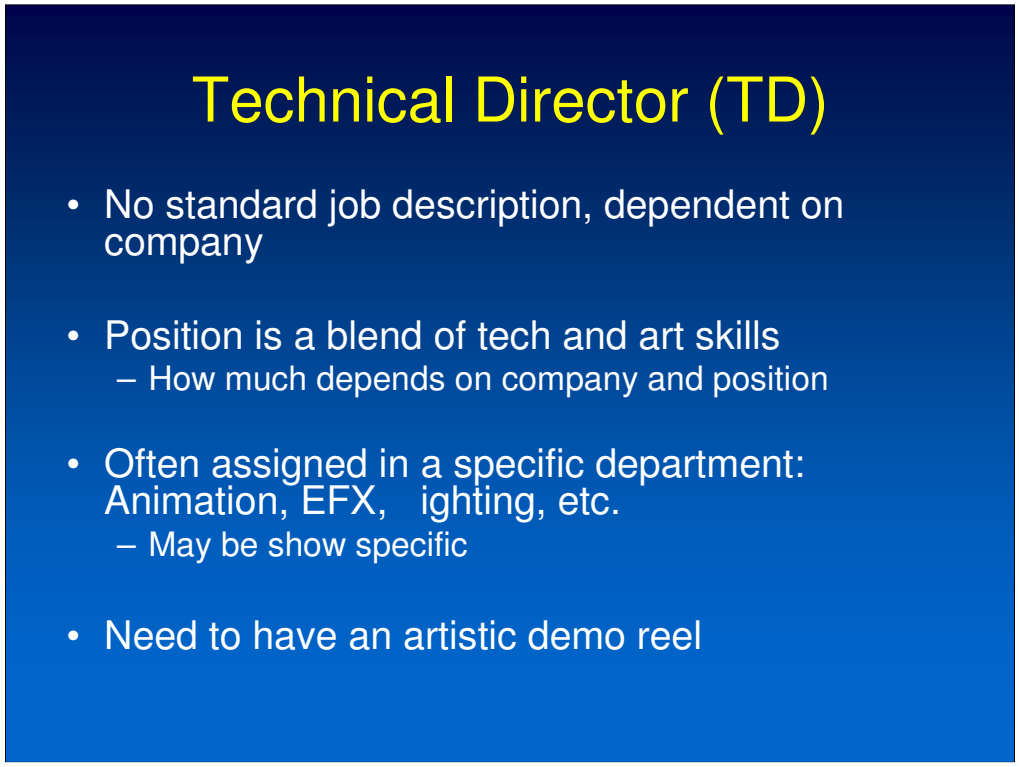
User Interface (GUI / Artist's Tools)

Pipeline

Release or Software Configuration Management

Quality Assurance (QA)

Rendering

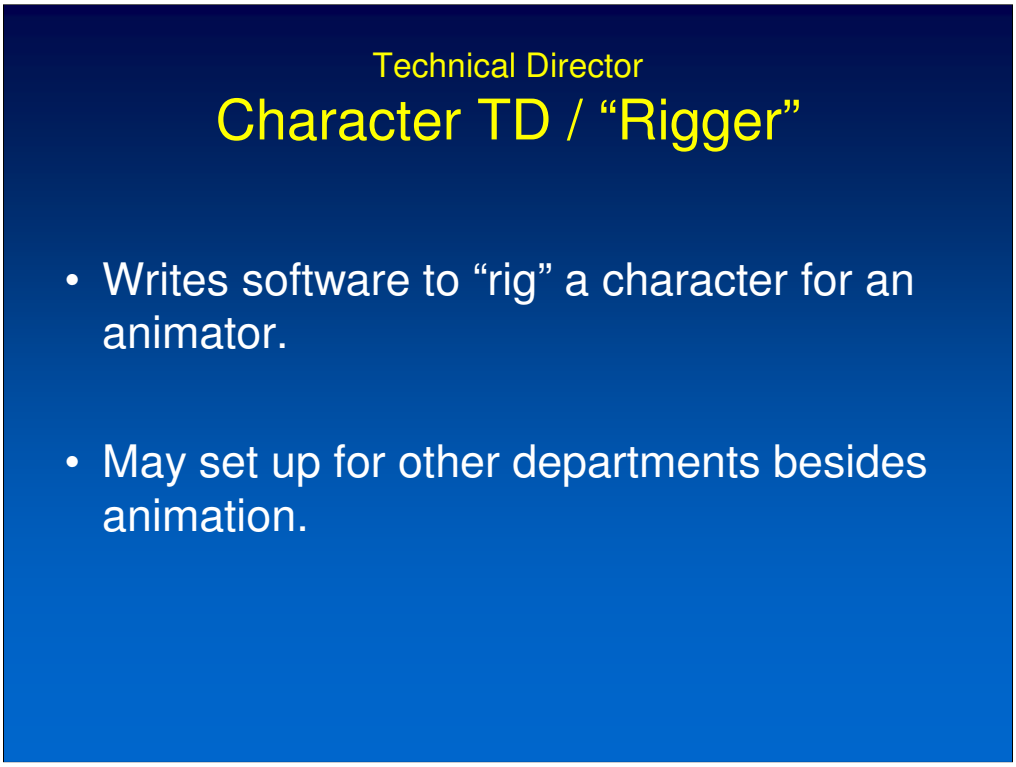


11. Technical Director (TD)

There is no standard job description for this position. Each company has its own definition. In general, the position is a blend of technical and artistic skills. How much of each is defined by the company and the position. For example, at a company with artistic and technophobic animators, the Animation TD will write user friendly tools for the animators. In a company with technically adept animators, the Animation TD may also animate, or write programs that assist the animator, such as automatically animating tedious work.

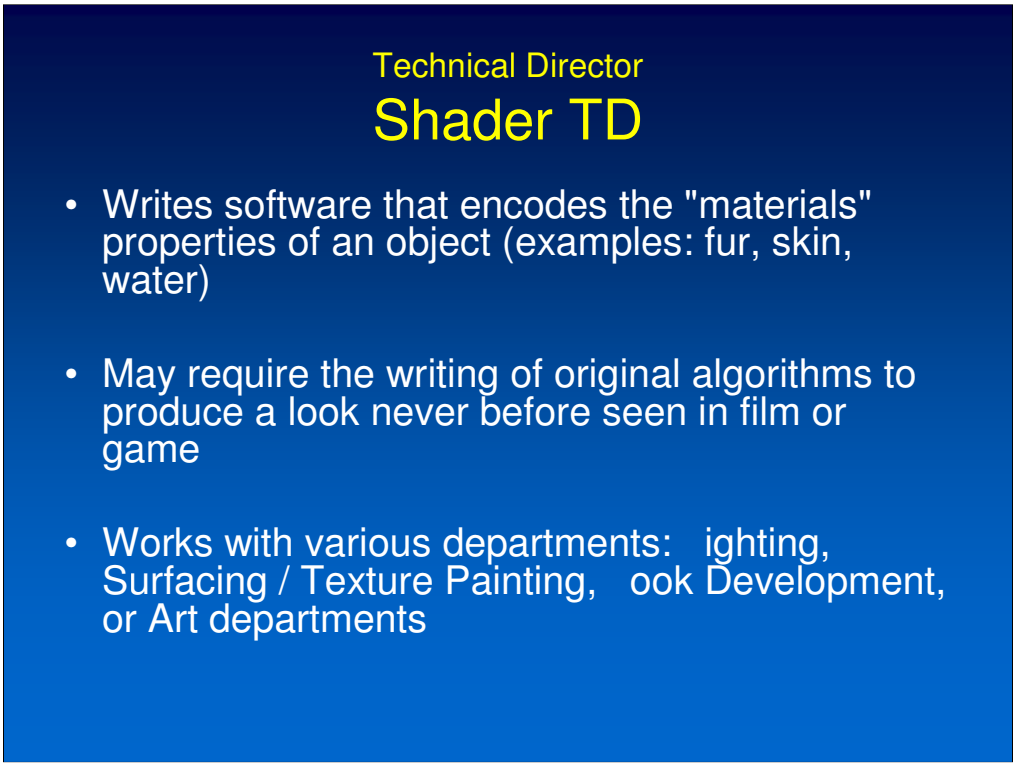
TD's are often assigned in a specific department: Animation, EFX, ighting, etc. They be assigned to a specific show, or assigned to a department. In many companies, they have quotas (number of shots to complete in a week). They must turn the shots around quickly with the highest quality. To do this, they must understand Resource Management (memory, processor time, disk space trade-offs) so they can get their shot completed with the quickest turn-around time and highest quality desired.

TD's (especially artistic TD's) need to have an artistic demo reel.



Character TD / “Rigger”

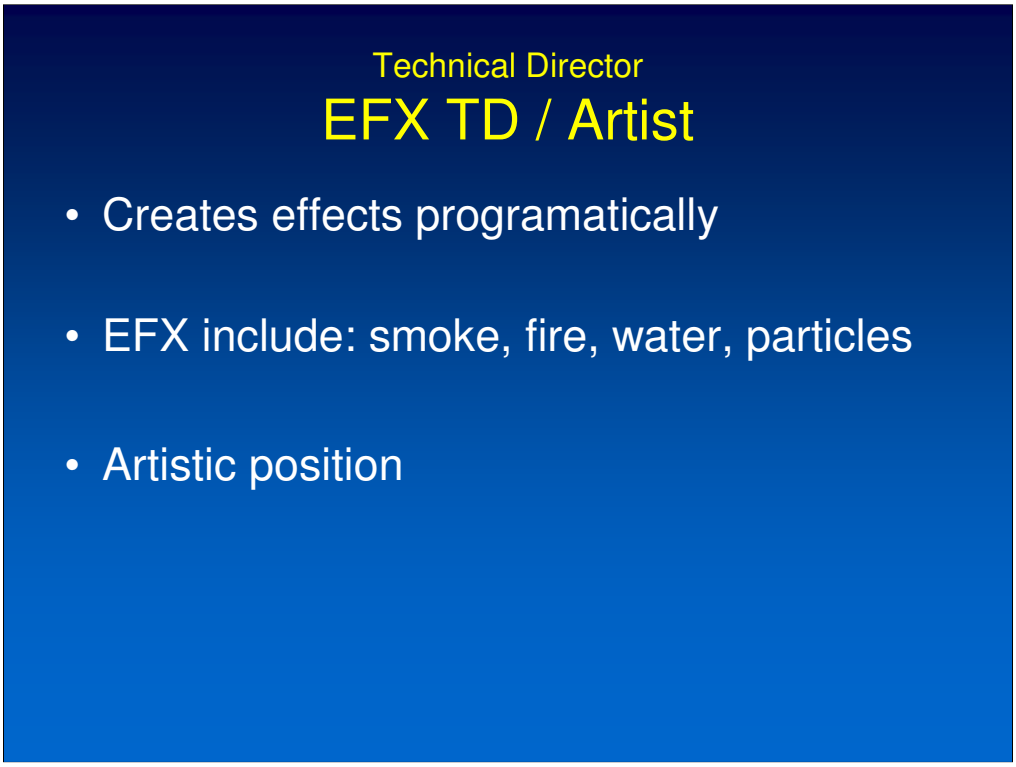
The Rigger writes software to “rig” a character (create the controls for the character) for the animation department. The TD may also set up tools or “rigs” for other departments. These tools control the skeleton, hair, cloth, and deformation (squash and stretch) for a character.



Shader TD

A Shader TD writes software that encodes the "materials" properties of an object (examples: fur, skin, water). Shaders provide the surface color, texture, and illumination properties of all the objects in a film or game. These are created using programming techniques and digital paint, which occasionally requires original algorithmic work.

Shader TD's work with various departments such as ighting, Surfacing / Texture Painting, ook Dev or Art departments.



Effects (EFX) TD / Artist

The Effects TD creates effects programmatically. The EFX TD might program some procedural animation, write tools for non-technical artists to create effects, or develop an EFX system (dust, crowds, etc.).

EFX often include: Smoke, Fire, Water, Particles (Breaking objects).

Some areas of coding are: particle systems, fields, expressions, ME scripts, soft bodies, rigid bodies, cloth dynamics & particle instancing/flocking.

EFX TD's develop EFX systems and use EFX Systems developed by other animators. These systems cover water (oceans, waves), dust (tornadoes, dust storms), crowds, feathers, breaking objects, fire, smoke, etc. The systems are used to simulate real objects (like an ocean) or to animate something too complex or time-consuming for artists to animate over many frames (crowds).

EFX TD's need to know or be familiar with Houdini, Maya, and other 3rd party applications.

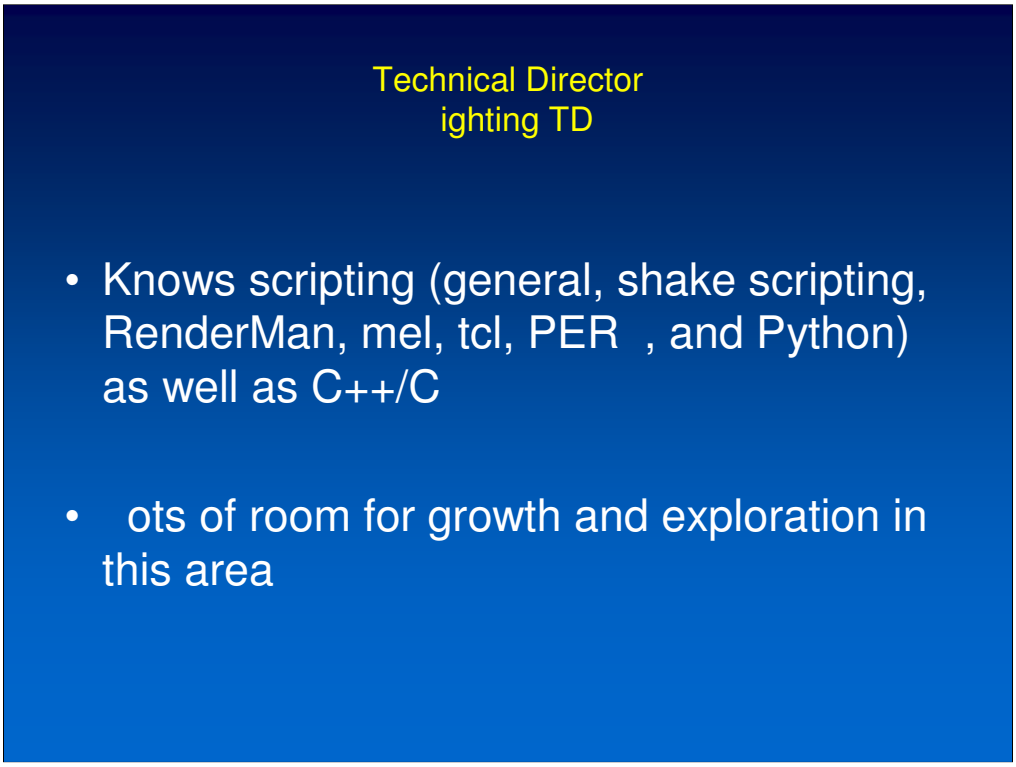
ighting TD

The ighting TD works with Shader TD in determining look of film through its lighting. The ighting TD directs the lights onto objects within the frame of the movie. (This is opposed to the Shader TD's who specify what happens when light hits the objects.) If the shot is for a special effect in a live action movie, then the lighting must match lighting that has been filmed. In a purely animated feature, the lighter has more discretion.

ighting TD's have a basic knowledge of shader writing, and understand the basic physics of light, including the types of lighting (ambient, diffuse, specular), occlusion, and reflection and refraction.

The ighting TD may work with Director or Director of Photography.

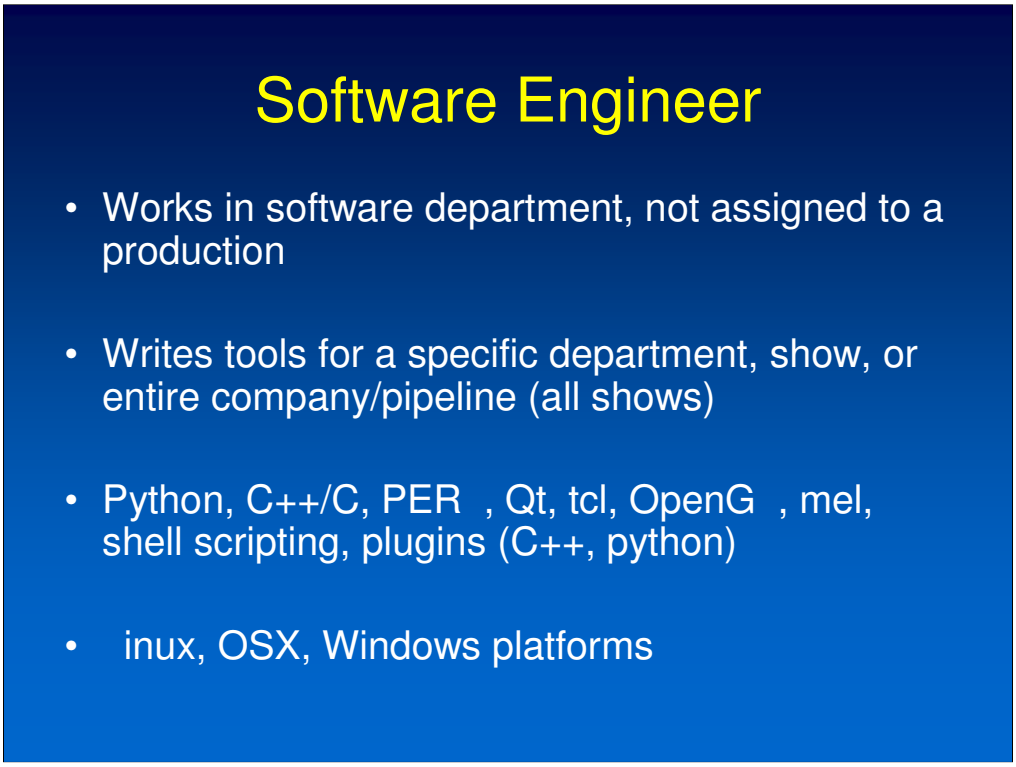
The ighting TD designs tools for less technical lighters as well as lights shots.



ighting TD (continued)

The ighting TD needs to know scripting (general, shake scripting, RenderMan, mel, tcl, PER , and Python) as well as C++/C.

There is lots of room for growth and exploration in this area, particularly from a technical standpoint. ighting often comes at the end of the pipeline and at the end of the movie production, so the ighters do not have a lot of time for lighting. Any tools that improve this situation, provide more control and faster lighting, are highly desired.



12. Software Engineer

Software engineers work in the software department, and are not assigned to a production. They are usually outside of a particular production and serve all productions and other departments.

They write tools for a specific department, show, or for the entire company / or an all-show pipeline.

anguages used are Python, C++/C, PER , Qt, tcl, OpenG , mel, shell scripting, shake scripting, and C++ or python for plugins. They may also program in HTM , JavaScript or Flash.

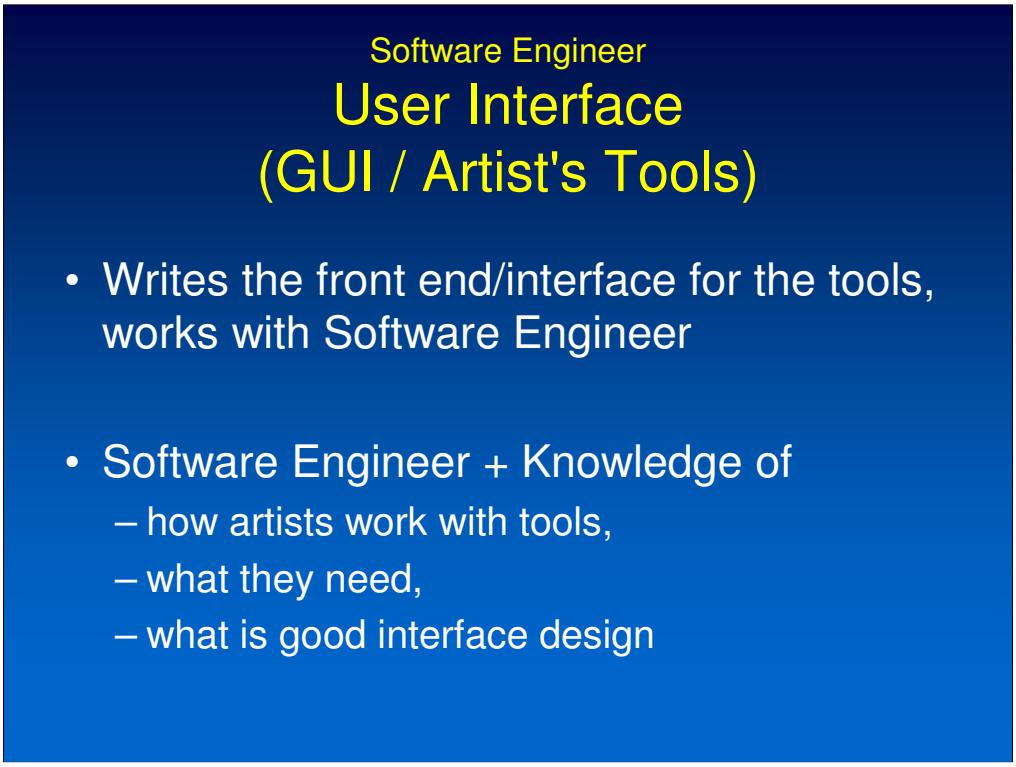
Platforms used include inux, OSX, and Windows.

Some example tasks are:

Writing a frame or movie viewer, to view all rendered frames in real time

Writing a camera tracking program that allows the artist to easily place objects in a 3D space

Writing a program that manages how software gets released to all users



Graphical User Interface (GUI) Engineer

The GUI Engineer writes the front end user interface for the tools, and works with other Software Engineers. For example, the GUI Engineer might write the code that only deals with the users, while another engineer deals with the back-end of the software, such as a database interface, or interface with other programs.

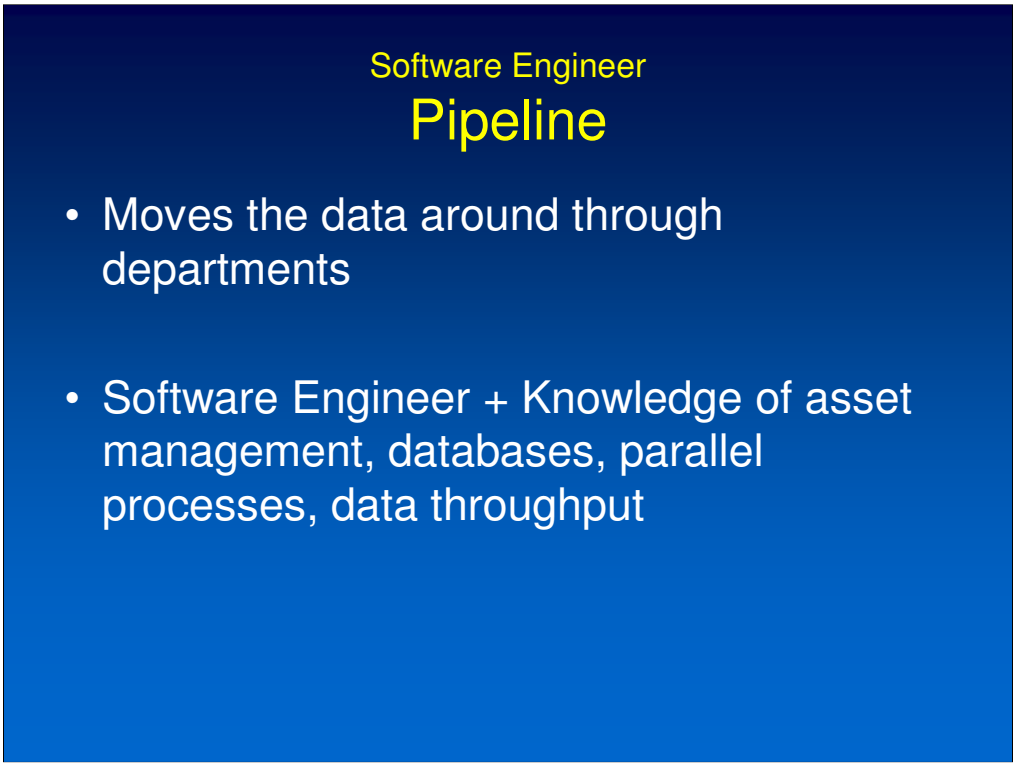
A GUI Engineer has the same basic knowledge as a generalist Software Engineer, plus knowledge of:

how artists work with tools,

what they need,

and what is good interface design.

In addition to the usual software languages, GUI Engineers need to know Qt and tcl.



Pipeline Engineer

A Pipeline Engineer moves the data (artwork and production information) around through departments. At this time, most pipelines are individual to the studio, but there are some commercial pipelines available.

A Pipeline Engineer has the same basic knowledge as a generalist Software Engineer, plus knowledge of:

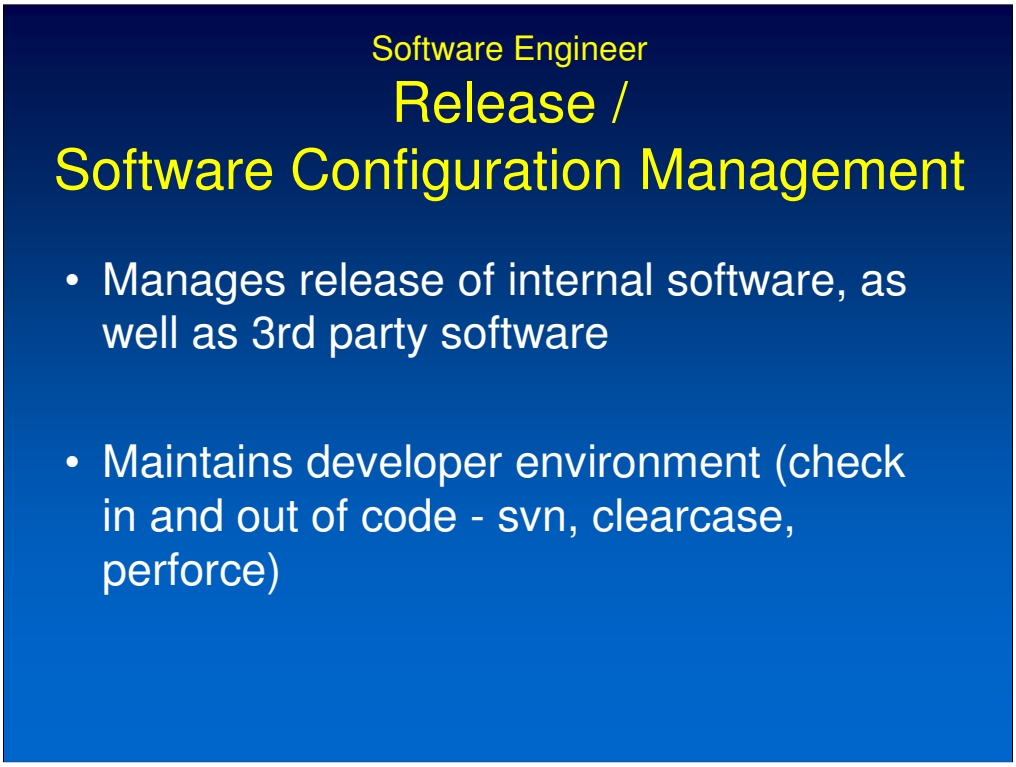
asset management,

databases,

parallel processes,

and data throughput.

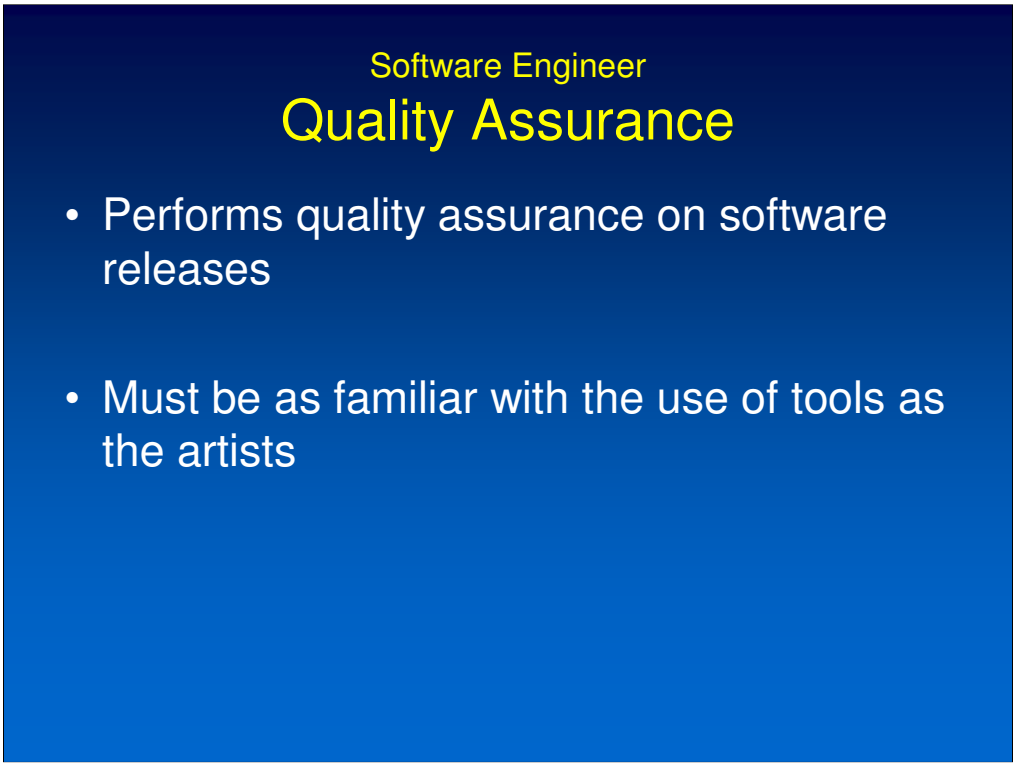
Pipeline Engineers write much of their code in a scripting language such as Python or PER .



Release Engineer / Software Configuration Management

The Release Engineer manages release of internal software, as well as 3rd party software to all users and rendering systems at the facility.

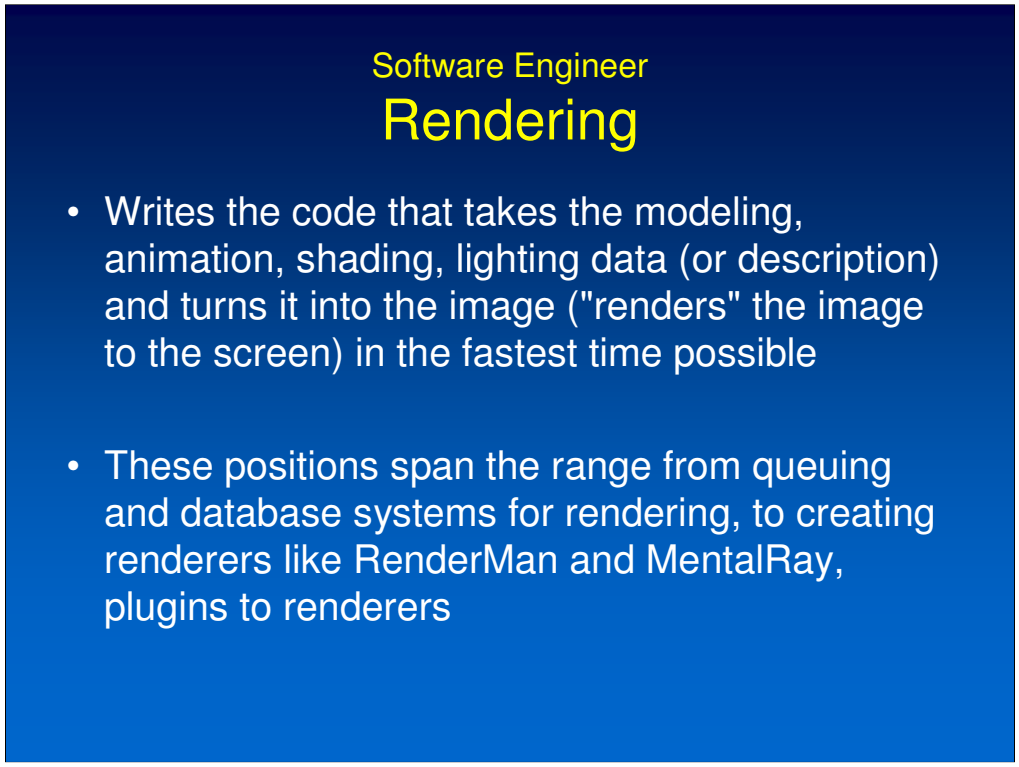
The Software Configuration Engineer maintains the developer environment (check in and out of code, using for example: svn, clearcase, or perforce).



Quality Assurance Engineer

The QA Engineer performs quality assurance on software releases. This position requires imagination (to imagine what can go wrong) and determination (break that software!).

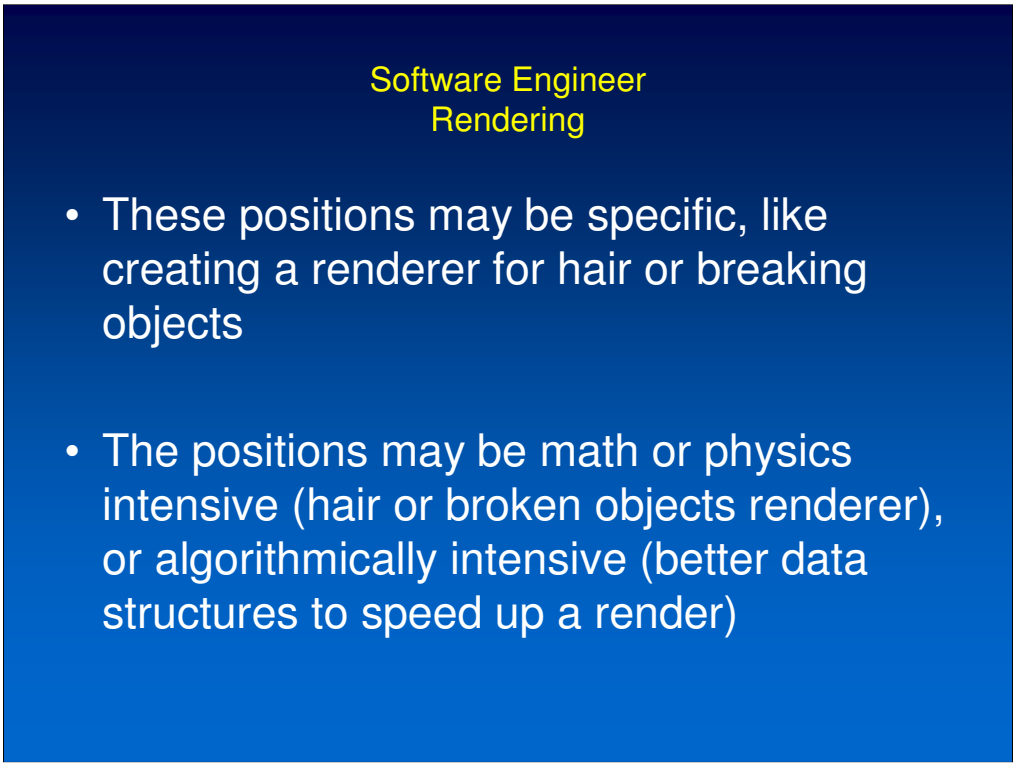
The QA Engineer must be as familiar with the use of tools as the artists, and be able to think like an artist to help shake out bugs. Also, the QA Engineer may help with automating testing so that the focus remains on finding problems in newer tools, while maintaining the quality of the older tools via automatic testing.



Rendering Engineer

The Rendering Engineer writes the code that takes the modeling, animation, shading, lighting data (or descriptions) and turns it into the image ("renders" the image to the screen) in the fastest time possible.

These positions span the range from queuing and database systems for rendering, to creating renderers like RenderMan and MentalRay, and writing plugins for renderers.

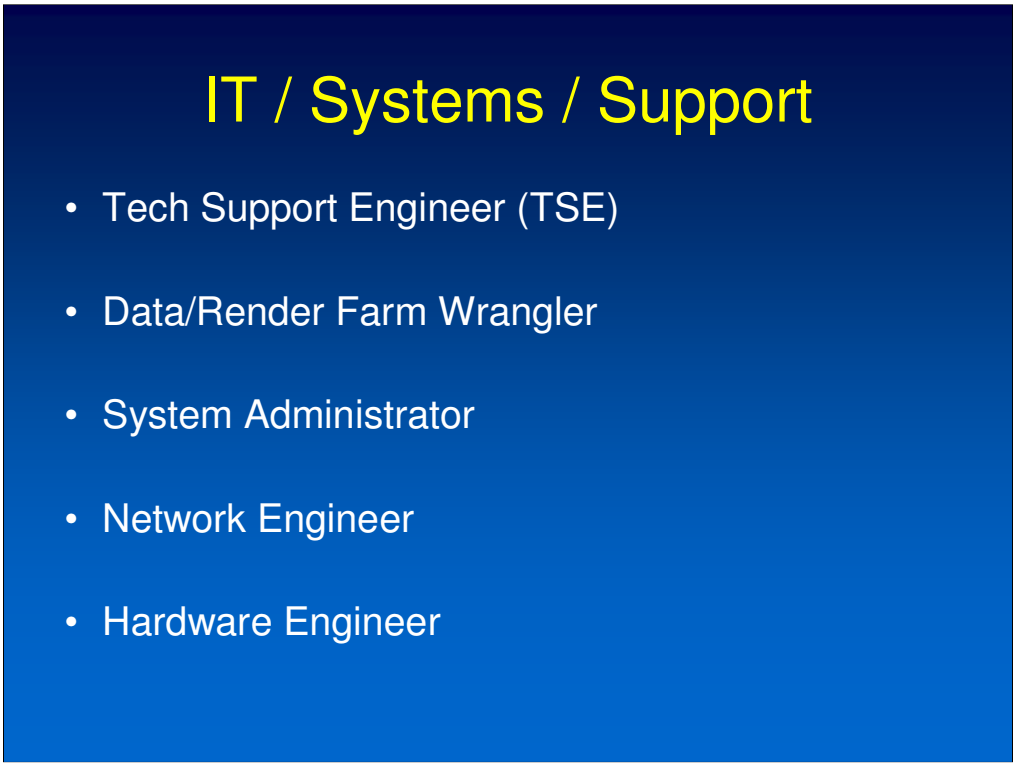


Rendering Engineer (continued)

These positions may be specific, like creating a renderer for hair or breaking objects.

The positions may be math or physics intensive (hair or broken objects renderer), or algorithmically intensive (better data structures to speed up a render).

The Rendering Engineer needs to understand distributed systems for distributed rendering.



13. IT / Systems / Support

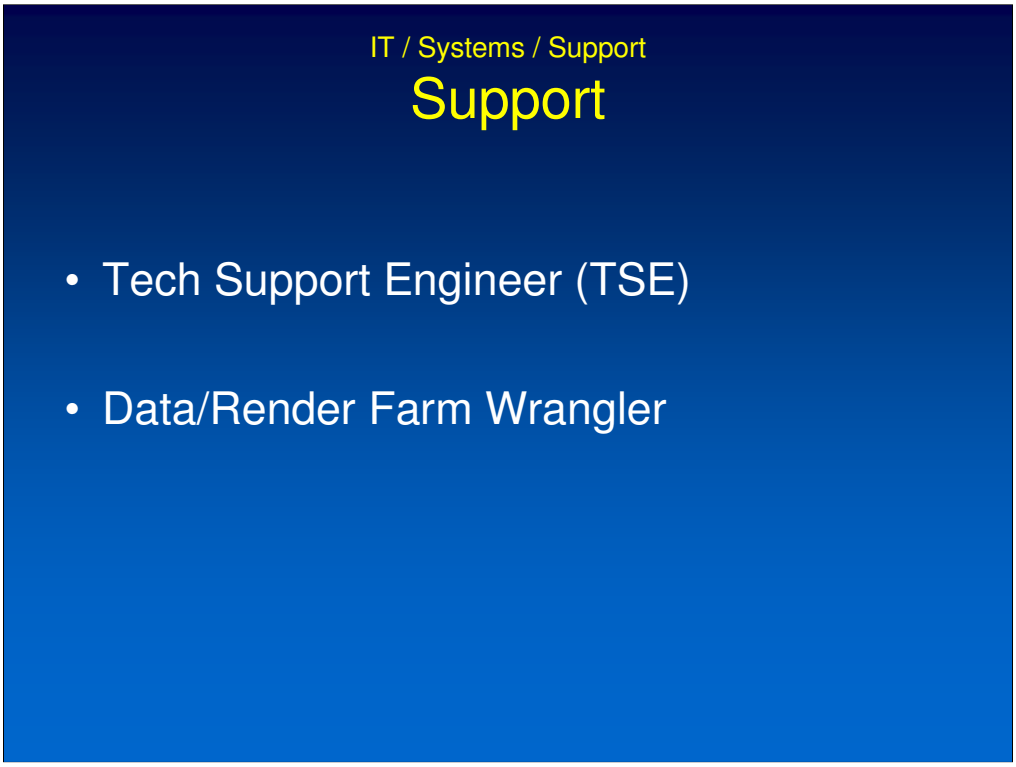
Tech Support Engineer (TSE)

Data/Render Farm Wrangler

System Administrator

Network Engineer

Hardware Engineer



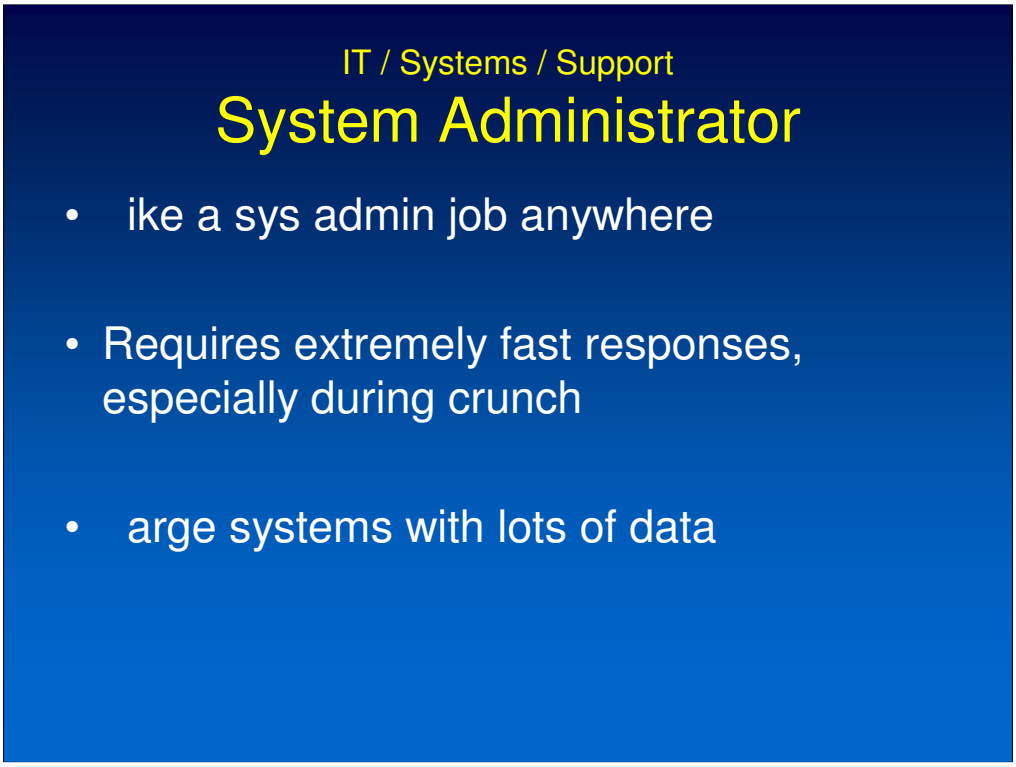
Support

Tech Support Engineer (TSE)

The position may be an Associate or Junior TD in a department, or centralized “help desk” position. The Jr. TD may receive questions that are simple and resolved in 2 minutes (like user typo’s, etc.) to complex issues spanning many departments and covering major outtages.

Data/Render Farm Wrangler

This position may be filled with interns, or people with a Master’s in Computer Science. It is a critical job, but might not have high status. Basically, you are “babysitting” the renders. That might involve notifying artists when renders fail, or completed, or may involve trouble-shooting failed renders or render farm problems.



System Administrator

System Administrators take care of the computers at a company. This involves installing and patching software, and setting up the basic operating system for the company. In the CG field, especially in film or games, the requirements of the job remain the same, with these differences:

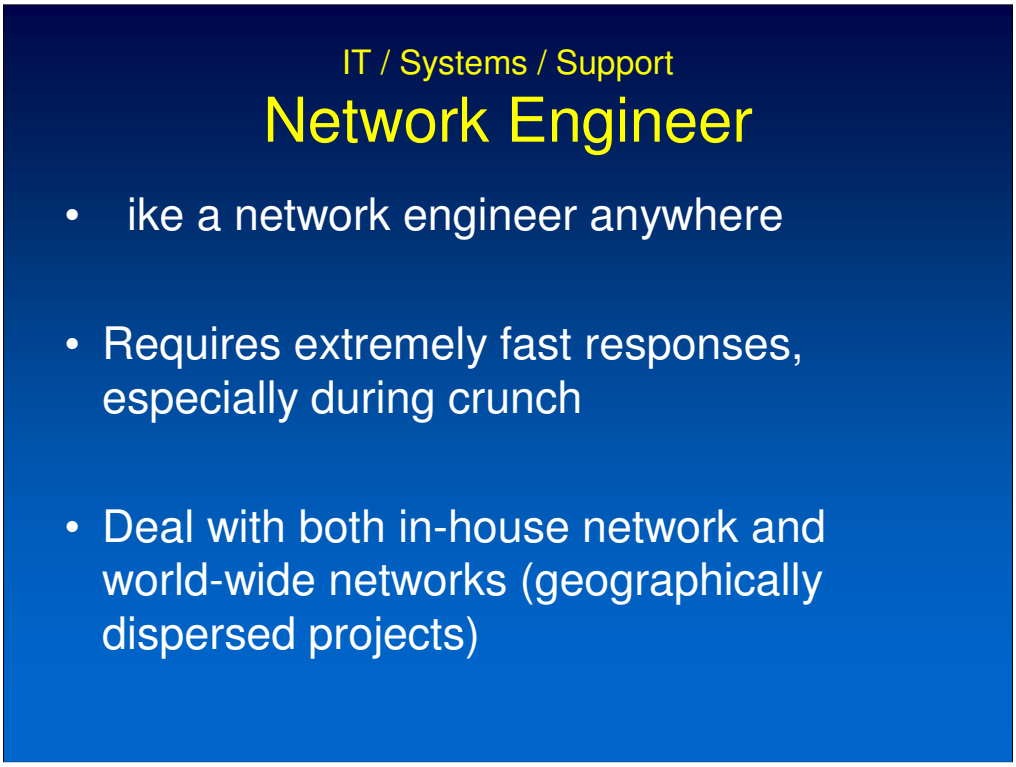
•Requires extremely fast responses, especially during crunch.

•Requires dealing with large systems with lots of data, similar to the banking industry.

•Requires knowledge of a variety of platforms, especially inux.

•Maintains a variety of software, both artistic and business related.

•Requires knowledge of hardware that supports large amounts of data.

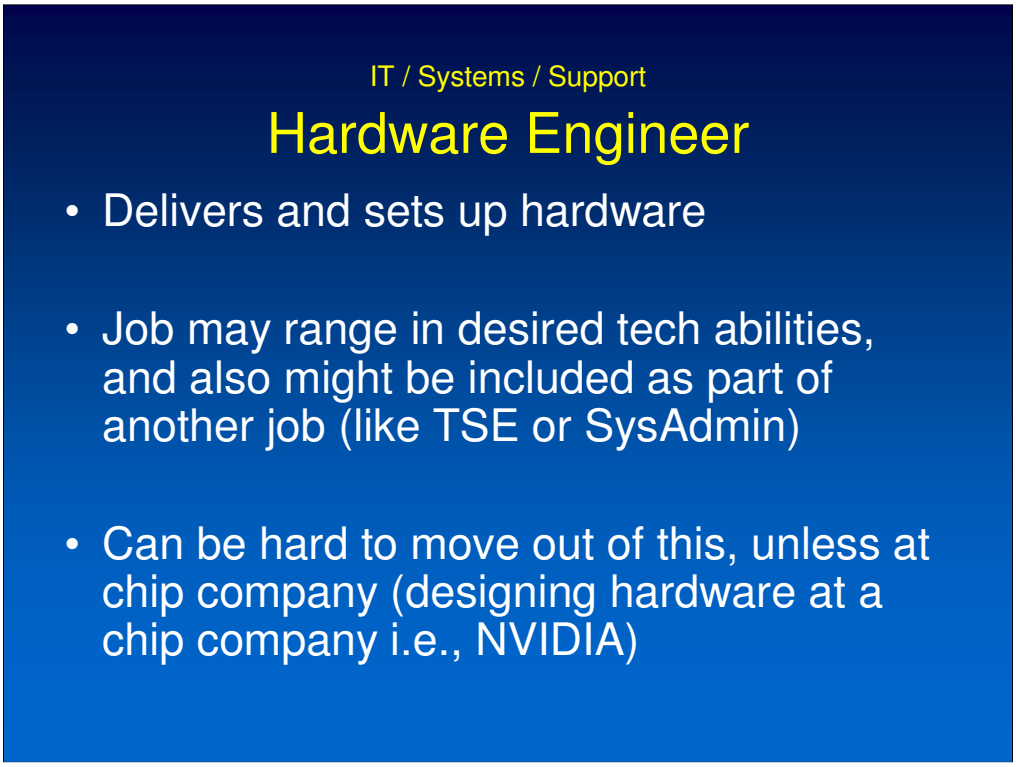


Network Engineer / Network Administrator

Network Engineers / Administrators take care of the network at a company. This involves installing and upgrading the network, as well as managing security software. In the CG field, especially in film or games, the requirements of the job remain the same, with these differences:

•Requires extremely fast responses, especially during crunch

•Deals with both in-house network and world-wide networks (geographically dispersed projects)

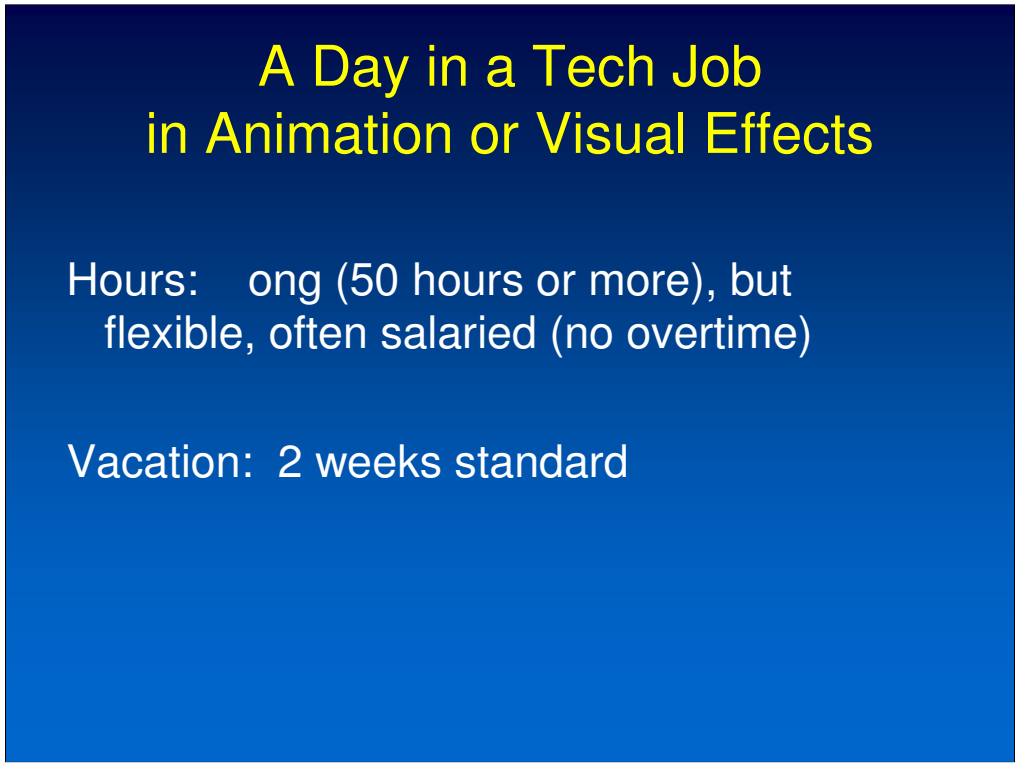


Hardware Engineer

The Hardware Engineer delivers and sets up hardware at an Animation or Visual Effects company. At a hardware or chip company (like NVIDIA or Intel), the Hardware Engineer will be designing the hardware graphics devices.

This job will range in desired tech abilities, depending on the company. Tasks might be included as part of another job (like TSE or SysAdmin).

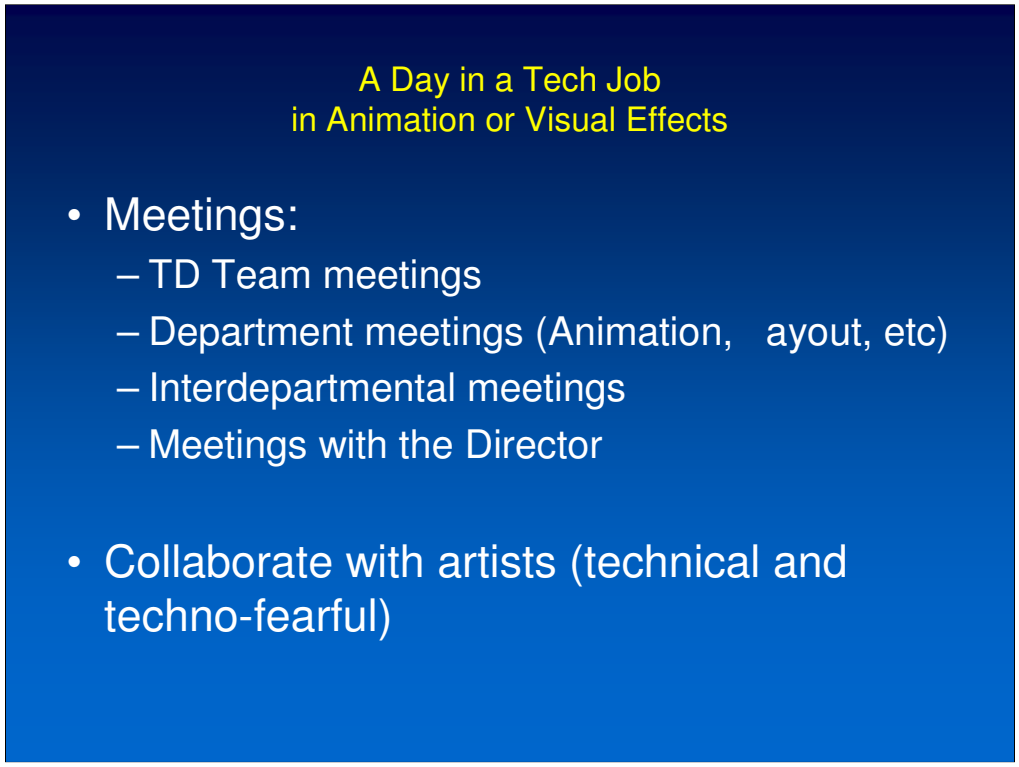
It can be hard to move up from this job if you are just delivering and setting up hardware.



14. A Day in a Tech Job in Animation or Visual Effects

Most TD's start between 7am and 10am, but your hours are likely to be flexible. Many people stay late if they don't have a family or if they have family help (spouse, nanny, Mom, etc.). Several studios in the US have 50 hour work weeks as the default.

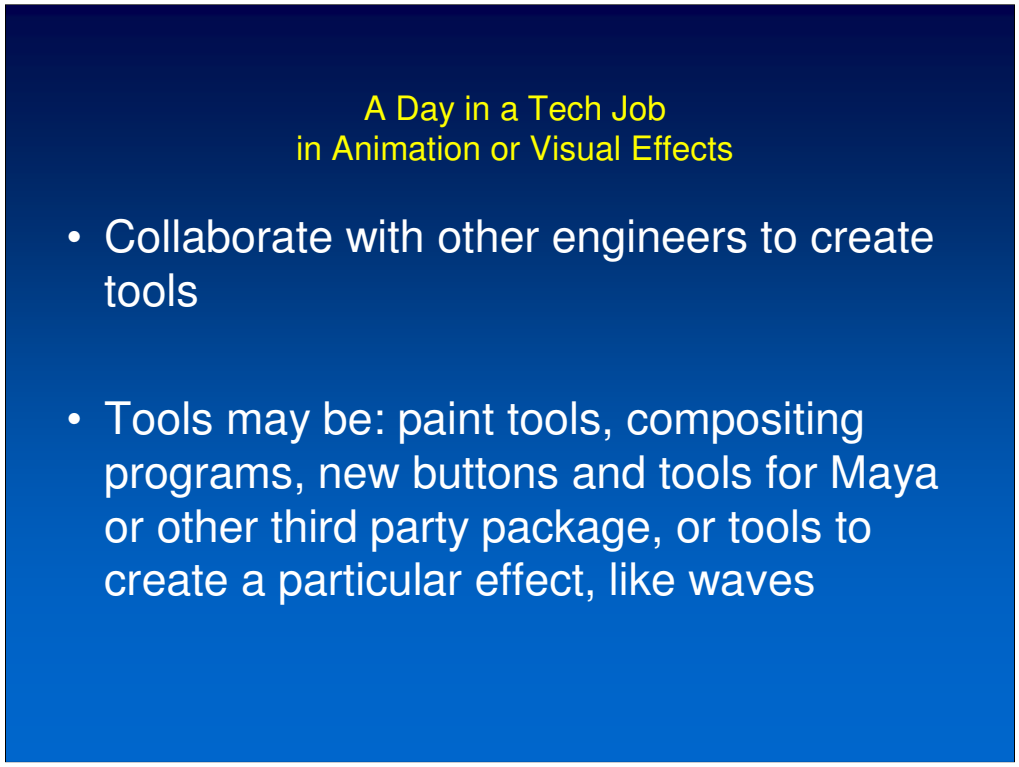
Two weeks vacation in the US is standard to start. Some companies give “PTO” (paid time off) which combines your vacation and sick time into “time off.”



A Day in a Tech Job in Animation or Visual Effects (continued)

TD's may attend department meetings if assigned to a department (Animation, ayout, etc) in addition to their own team meetings (TD's), and meetings specific to their work (hair, cloth, inter-departmental meetings).

TD's and Engineers collaborate with artists (technical and techno-fearful). They discover the requirements of the artist, write the tools for them, then meet again with the artists to train them and receive feedback on the tools. It is an iterative process.

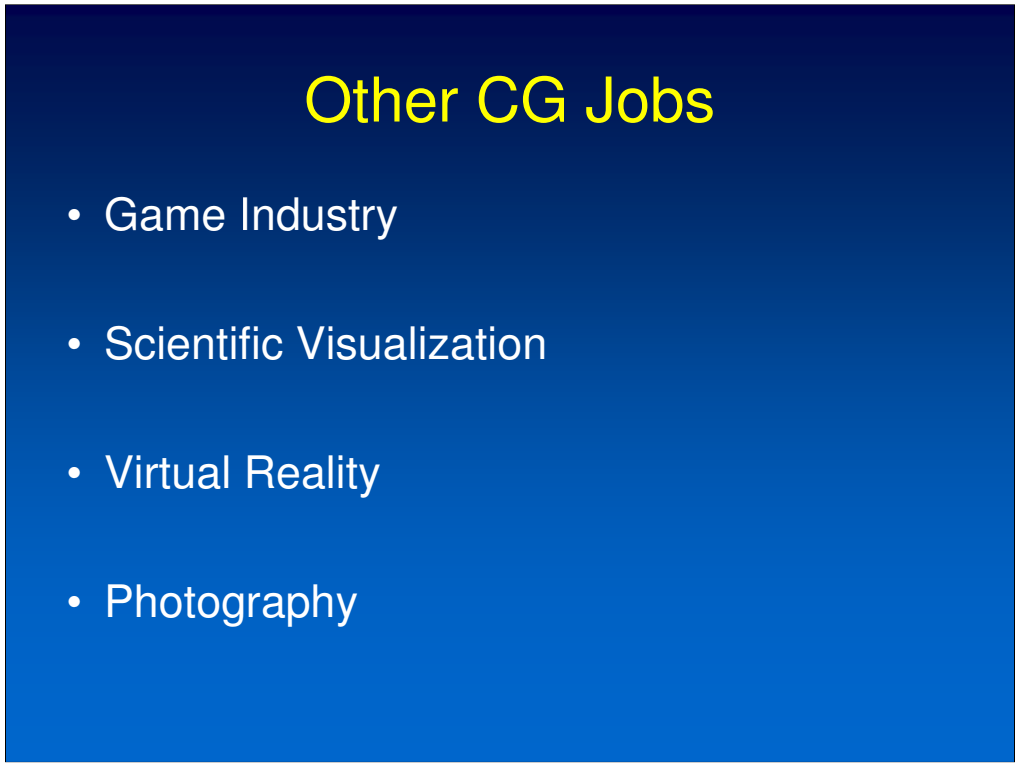


A Day in a Tech Job in Animation or Visual Effects (continued)

TD's and Engineers collaborate with other engineers to create tools, creating the back-end portion of tools that the users don't see. (For example, users don't care where their artwork is stored as long as they get the correct artwork when they ask for it.)

For example, tools created may be:

- paint tools,
- compositing programs,
- new buttons
- and tools for Maya or other third party package,
- or tools to create a particular effect, like waves.



15. Other CG Jobs

There are a lot of other jobs in the Computer Graphics field, such as Gaming, Scientific Visualization, Virtual Reality, Photography, Hardware (chip makers, display screens), Web, aw, etc. Unfortunately, there isn't time to go into all of the subfields possible.

Gaming

Gaming is actually a larger arena in the CG Field than Film. Games make more money than film, though they are not considered sexy by the general public. There are more technical jobs in this arena, and it is helpful to be a gamer to get a job at a game company. The main technical conference to attend is the Gamer Developer's Conference hosted usually in March in San Jose, CA. The IGDA is the International Game Developers Association: http://www.igda.org/

Scientific Visualization

Scientific Visualization covers many disciplines of science, from neuroscience (mapping brains) to astronomy (mapping the universe). The work may be strictly artistic (simulating the travels of the Mars rover) to completely programmatic (modeling ocean waves to simulate tsunamis).

Virtual Reality

Virtual Reality spans many disciplines, such as Scientific Visualization, Gaming, and Training. The job may be artistic or computational, or both.

Other CG Jobs (continued)

Hardware (chip makers, display screens)

Hardware companies make many devices used in CG, from graphics cards to 3D Scanner and 3D printers.

Web

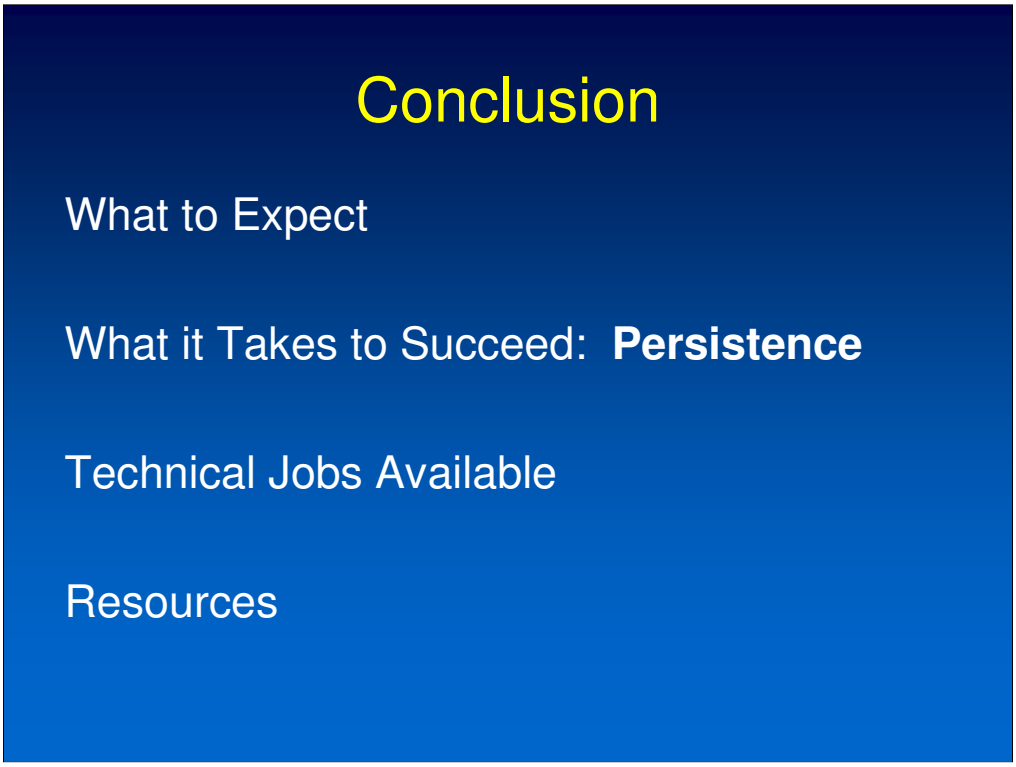
A lot of CG happens on the web, so much that it is easy to sub-specialize in the web. There are web graphics, web animation (flash), and a host of other avenues to explore.

This area has a lower barrier to entry (cost of software and training).

aw

The justice system is big business, and technical folk are needed to help recreate crime scenes and explain testimony to juries.

Etc.

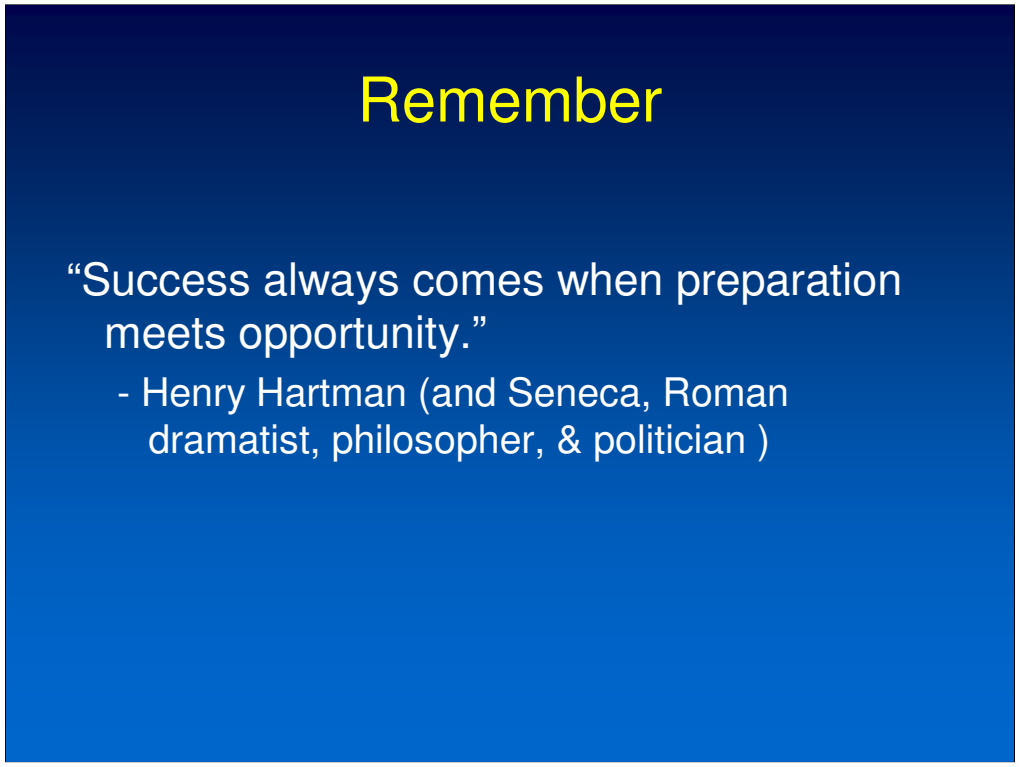


16. Conclusion

In conclusion, today I've covered:

- What you Need to Get the Job: **Education, Skills, Personality, & Process to Get the Job**
- What it Takes to Succeed: **Persistence** / **Tenacity** / **Passion** / **Focus** / **Dedication**
- Descriptions of some of the Technical Jobs Available

There are Resources listed later in the Course Notes

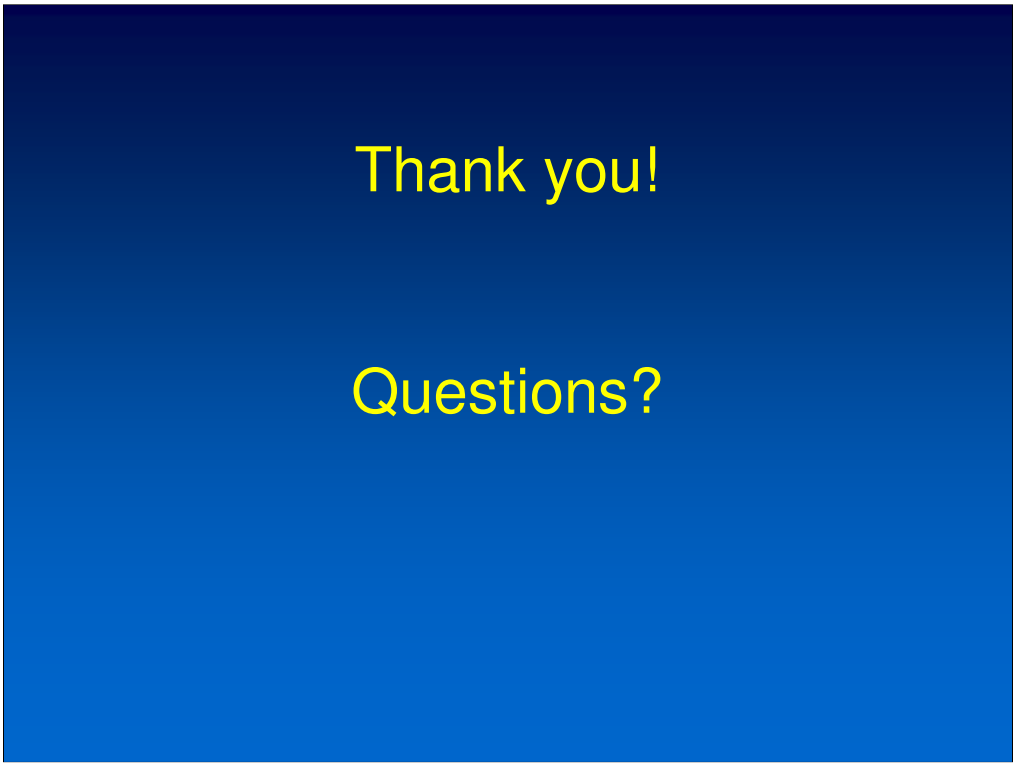


Remember

"Success always comes when preparation meets opportunity."

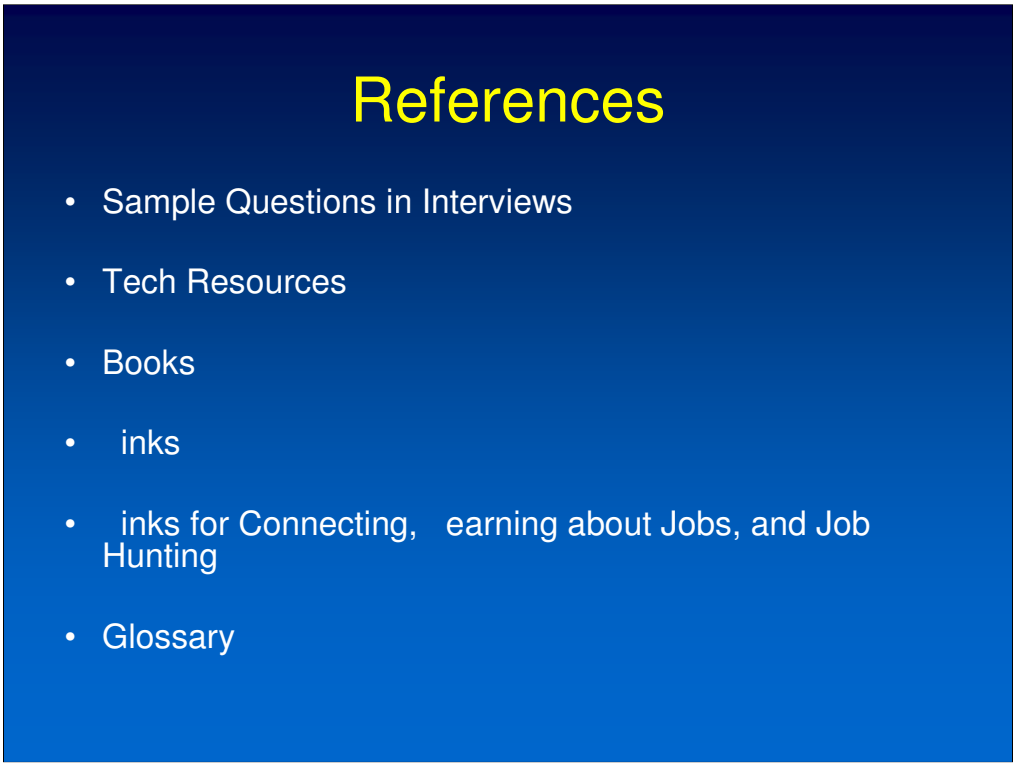
- Henry Hartman (and Seneca, Roman dramatist, philosopher, & politician)

Now you have the tools to take advantage of the opportunities that come your way.



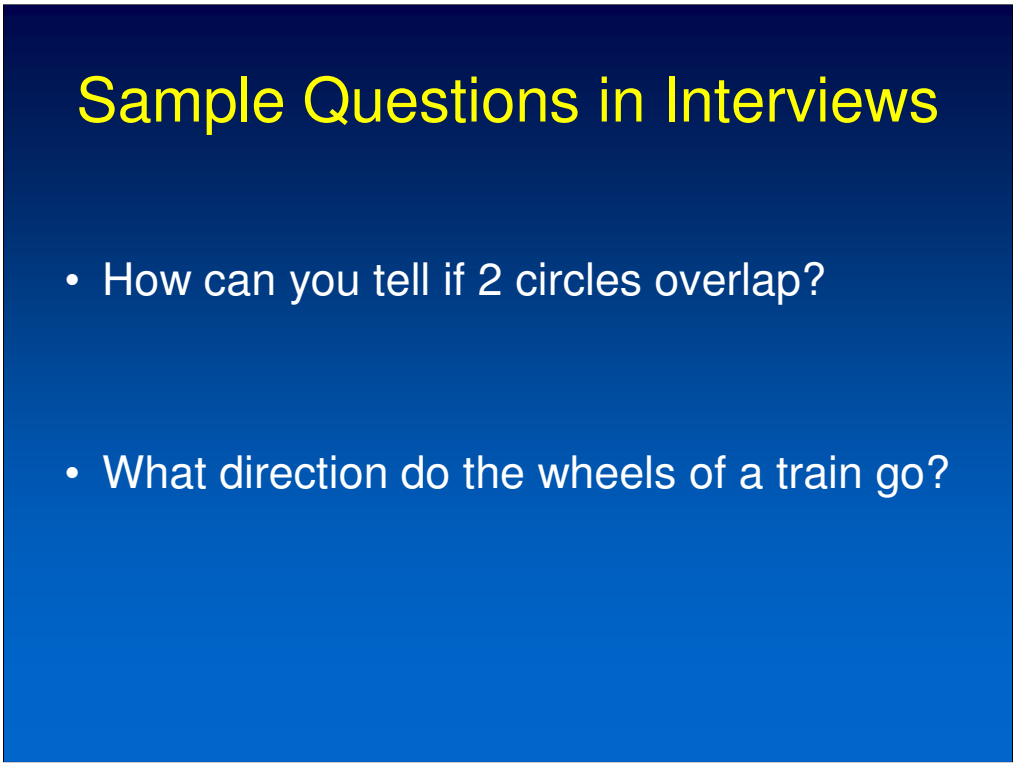
17. Thank you!

Questions?



References

I've provided some links to online technical resources, books, and sample interview questions and interviewing tips, as well as a glossary.

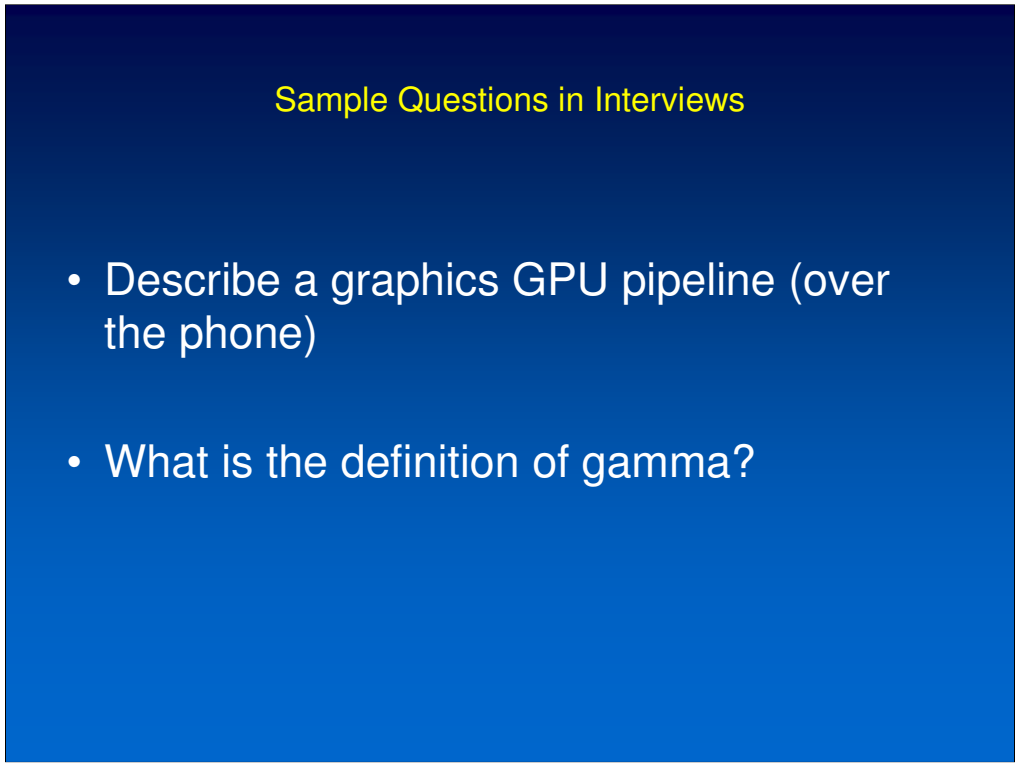


Sample Questions in Interviews

Questions that the interviewer from the company is asking you at the interview.

How can you tell if 2 circles overlap?

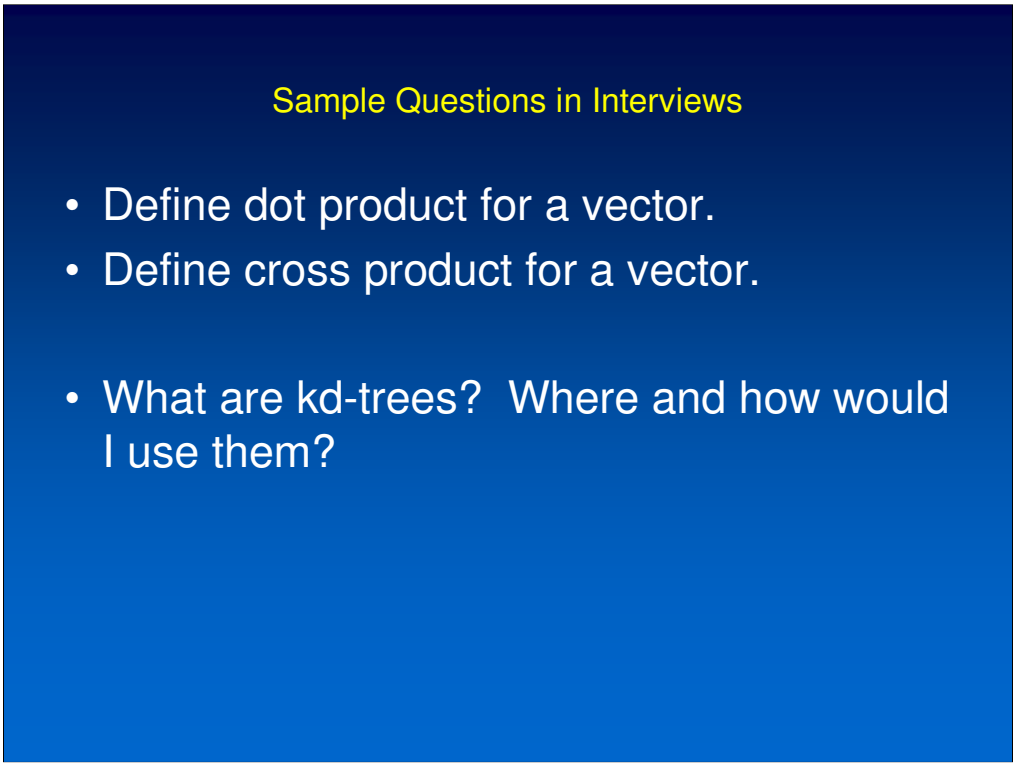
What direction do the wheels of a train go?



Sample Questions in Interviews

Describe a graphics GPU pipeline (over the phone)

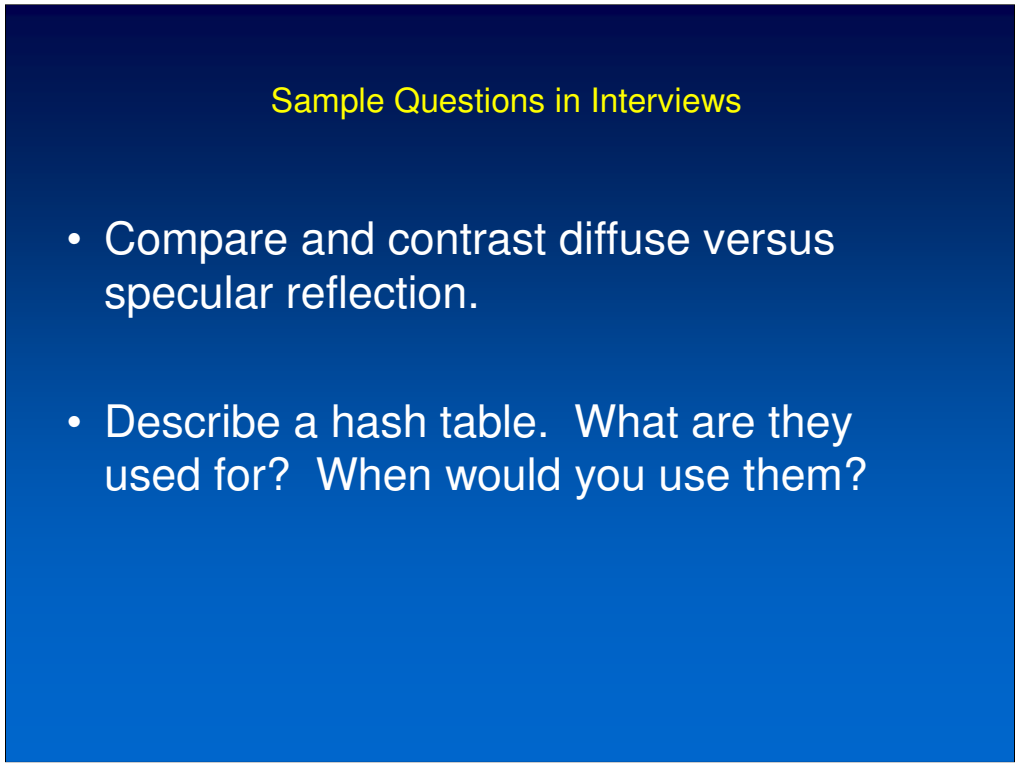
What is the definition of gamma?



Sample Questions in Interviews

Define dot product for a vector.
Define cross product for a vector.

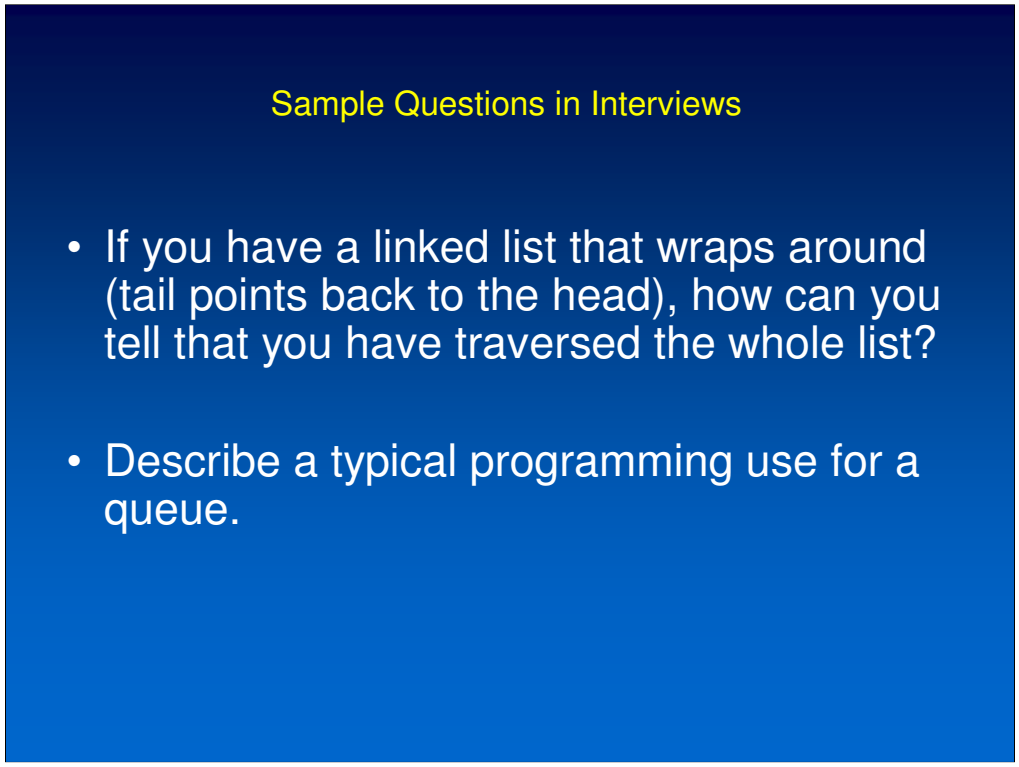
What are kd-trees? Where and how would I use them?



Sample Questions in Interviews

Compare and contrast diffuse versus specular reflection.

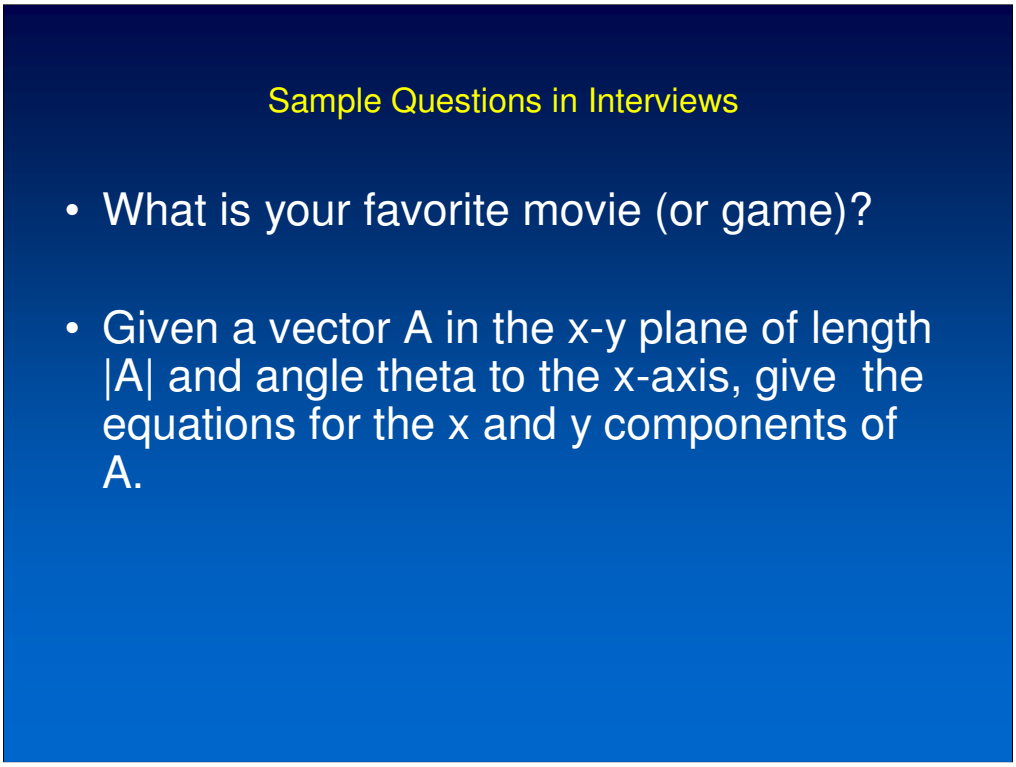
Describe a hash table. What are they used for? When would you use them?



Sample Questions in Interviews

If you have a linked list that wraps around (tail points back to the head), how can you tell that you have traversed the whole list?

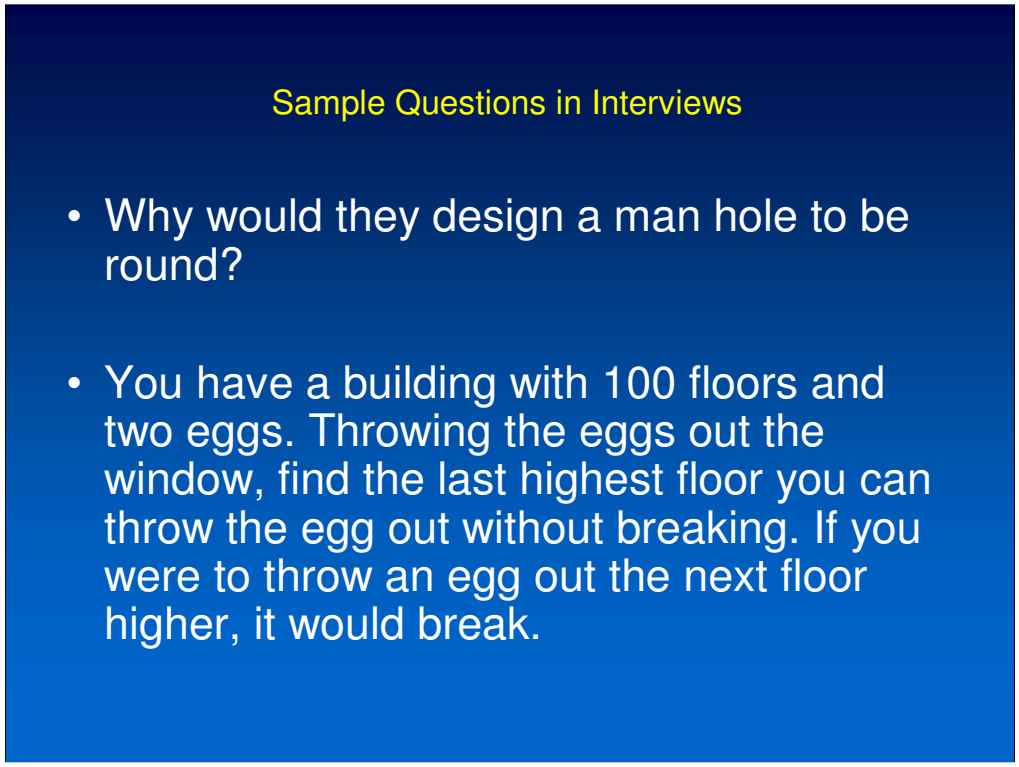
Describe a typical programming use for a queue.



Sample Questions in Interviews

What is your favorite movie (or game)?

Given a vector A in the x-y plane of length |A| and angle theta to the x-axis, give the equations for the x and y components of A.



Sample Questions in Interviews

Why would they design a man hole to be round?

You have a building with 100 floors and two eggs. Throwing the eggs out the window, find the last highest floor you can throw the egg out without breaking. If you were to throw an egg out the next floor higher, it would break.

More Sample Interview Questions

Google Interview Questions

by Jay Painter

http://www.drizzle.com/~jpaint/google.html

Interview Questions That You Should Ask

by Fran Zandonella

http://www.franzand.com/S08/my_interview_questions.html

Tech Resources

Dive Into Python

http://www.diveintopython.org/

Vector Math

http://www.netcomuk.co.uk/~jenolive/homevec.html

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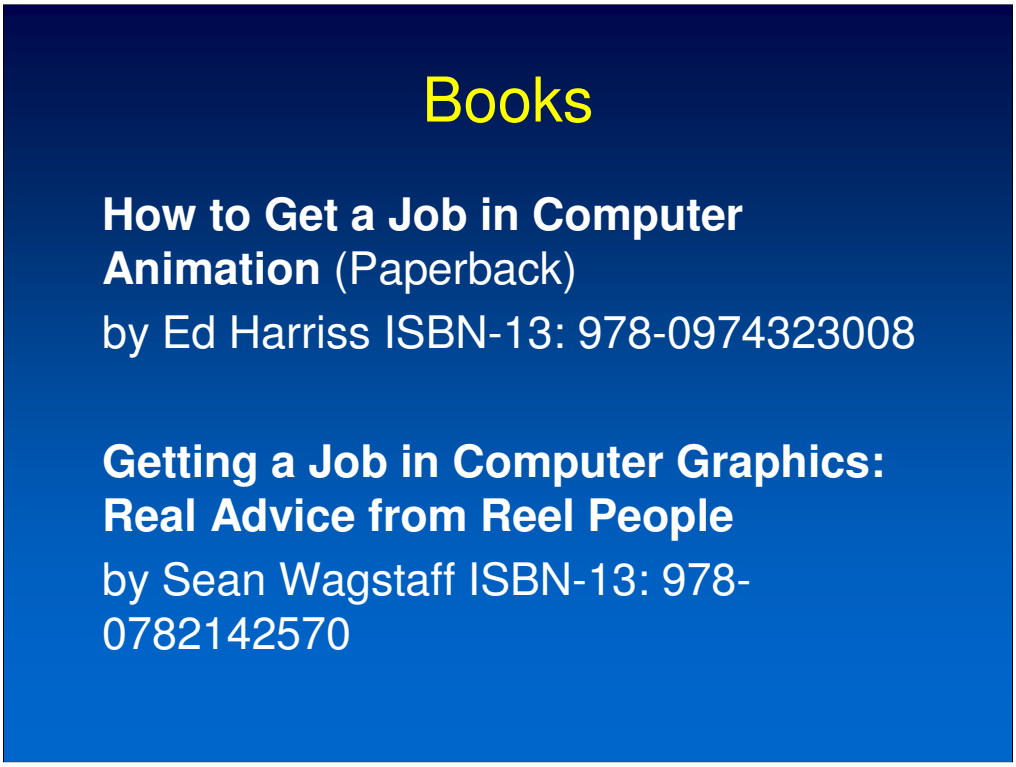
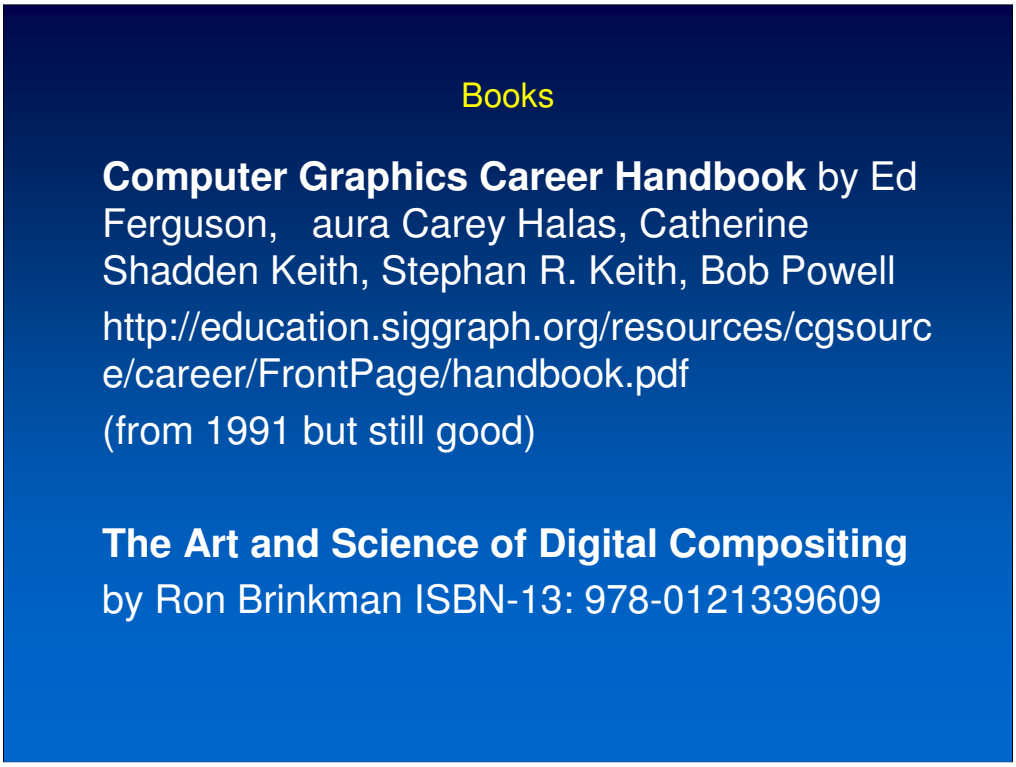
http://cslibrary.stanford.edu/105/



Books

How to Get a Job in Computer Animation (Paperback)
by Ed Harriss ISBN-13: 978-0974323008

Getting a Job in Computer Graphics: Real Advice from Reel People
by Sean Wagstaff ISBN-13: 978-0782142570



Books (continued)

Computer Graphics Career Handbook by Ed Ferguson, aura Carey Halas, Catherine Shadden Keith, Stephan R. Keith, Bob Powell

http://education.siggraph.org/resources/cgsource/career/FrontPage/handbook.pdf

(from 1991 but still good)

The Art and Science of Digital Compositing

by Ron Brinkman ISBN-13: 978-0121339609

inks

About Computer Graphics Jobs in Animation

http://www.infotechemployment.com/computer-graphics-animation-jobs.htm

http://www.3drender.com/jobs/TD.htm

http://www.skillset.org/animation/careers/3D_computer/article_4632_1.asp

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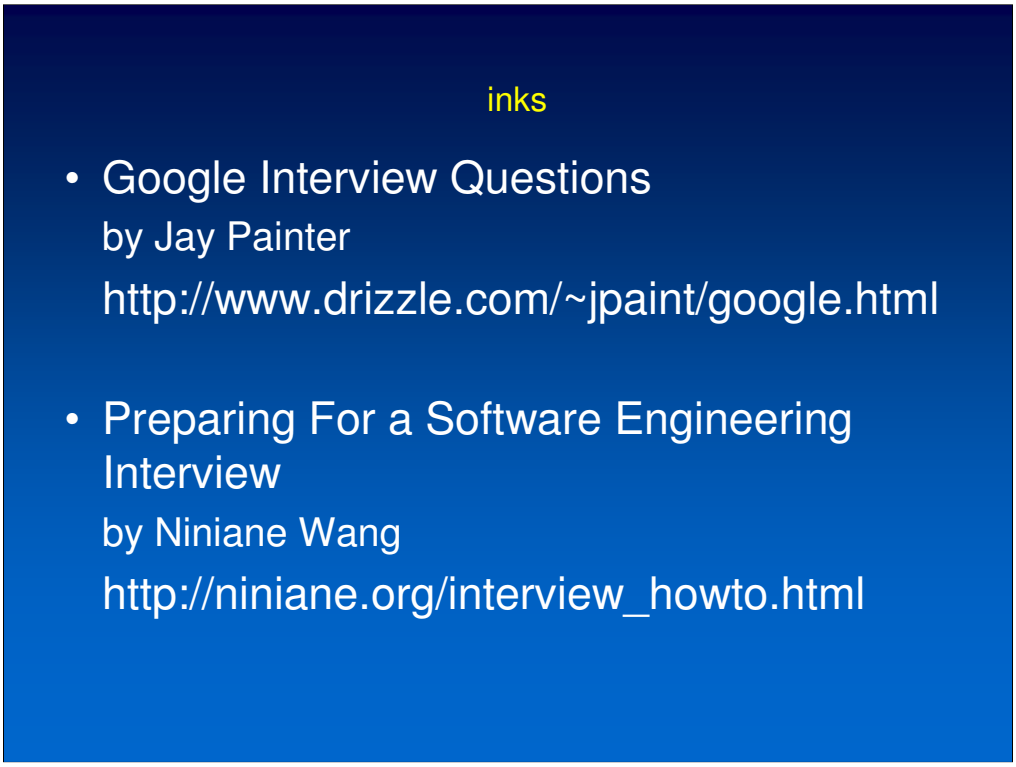


inks (continued)

Google Interview Questions
by Jay Painter
http://www.drizzle.com/~jpaint/google.html

Preparing For a Software Engineering Interview
by Niniane Wang
http://niniane.org/interview_howto.html

inks (continued)

Interview Questions That You Should Ask

by Fran Zandonella

http://www.franzand.com/S08/my_interview_questions.html

inks for Connecting, earning about Jobs, and Job Hunting

Inside CG

http://www.insidecg.com/

VFX Pro

http://VFXpro.com/

Highend 3D

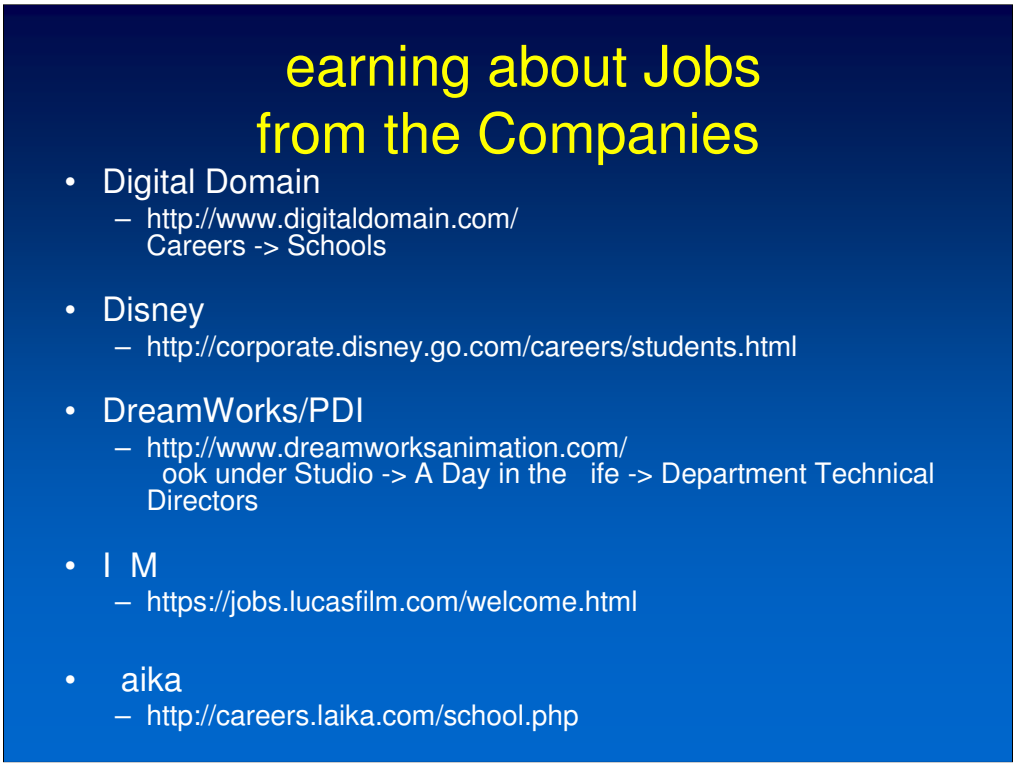
http://www.highend3d.com/

SIGGRAPH Jobs

http://www.creativeheads.net/

CG Society

http://jobs.cgsociety.org/about.php/



earning about Jobs from the Companies

Digital Domain

http://www.digitaldomain.com/
Careers -> Schools

Disney

http://corporate.disney.go.com/careers/students.html

DreamWorks/PDI

http://www.dreamworksanimation.com/
ook under Studio -> A Day in the ife -> Department Technical Directors

I M

https://jobs.lucasfilm.com/welcome.html

aika

http://careers.laika.com/school.php

earning about Jobs from the Companies (continued)

Pixar

http://www.pixar.com/companyinfo/jobs/uni_newgrads.html
http://www.pixar.com/companyinfo/jobs/uni_internfaq.html

Rhythm & Hues

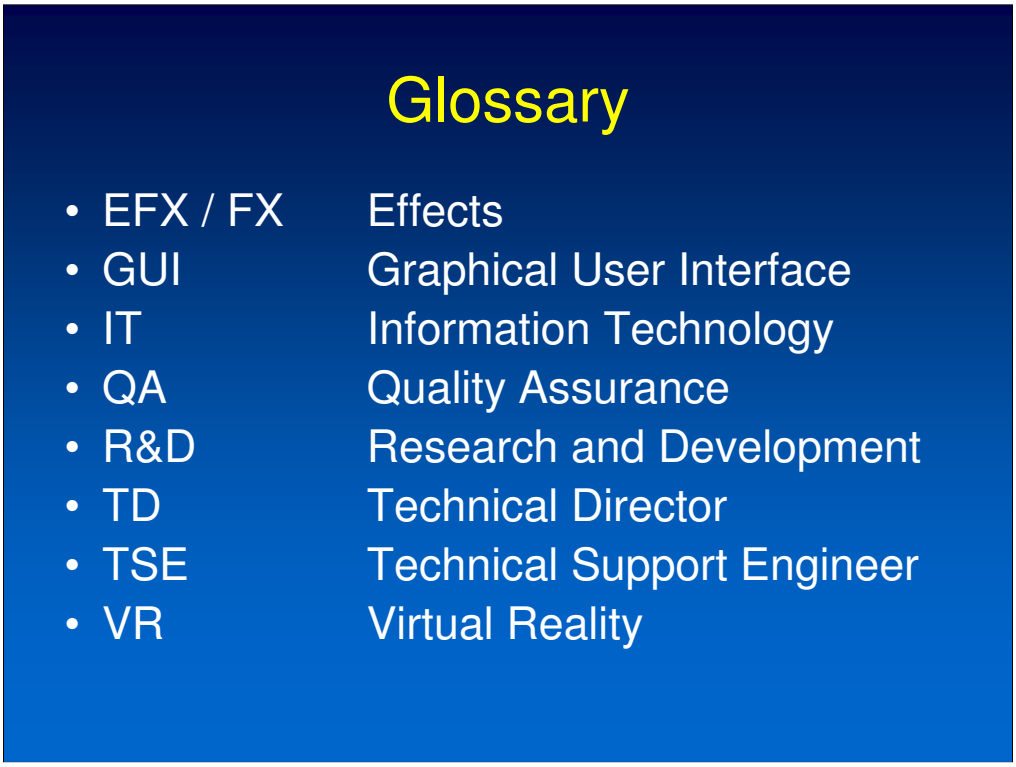
http://www.rhythm.com/inside_randh/opportunities_faq.shtml#faq7

Sony Pictures Imageworks

http://www.imageworks.com/jointheteam/academicresources.php
Contains a list of recommended colleges, schools, and reading resources.

WETA

http://www.wetadigital.com/digital/students/advice/



Glossary

EFX/ FX	Effects
GUI	Graphical User Interface
QA	Quality Assurance
R&D	Research and Development
TD	Technical Director
TSE	Technical Support Engineer
VR	Virtual Reality

Got Work!

Stan Szymanski,
SVP Creative Resources
Sony Pictures Imageworks

Stan Szymanski is Senior Vice President, Digital Production Creative Resources, Sony Pictures Imageworks.
Stan Szymanski s experience covers a wide range of visual effects experience on the creative, managerial and administrative sides of the business, including stints as a department manager, visual effects producer, production manager, postproduction supervisor and digital artist.

Szymanski is responsible for Sony Pictures Imageworks strategy for sustainable growth, with particular emphasis on the best location and utilization of satellite facilities along with overseeing the cross divisional integration of computer graphics supervisors, digital artists and other talented personnel.

Szymanski s experience and knowledge are key to efficiently organizing teams with the required skills and artistry to complete these projects on time, within budget.

Got Work!

Stan Szymanski
SVP Creative Resources
Sony Pictures Imageworks

Careers in VFX & Animation

How Do I Get In?

- **What Type of Company?**
- **Generalist vs. Specialist?**

Ask Youself

- **What Do I Want to Do?**
- **What Am I Good At?**

Who s Hiring for What?

- **Do the Research**
  - **What Projects are Green Lit?**
  - **Who s Doing the Work?**
  - **Rough Hiring Timeline**
  - **Network**
  - **Job Postings & Websites**

Making the Deal

- **What Does the Position Pay?**
- **Who Do I Talk to?**
- **Do I Use Representation?**
- **Handling Multiple Offers**
- **How to Work with a Recruiter**

The Lingo