

Pīkahu Name: Computational Thinking: the International Perspective

Video Name: Unplugged: The show. Part 7: Sorting networks

Presenters: Javier Jarquim, Matt Powell and Tim Bell

*Matt:* Say you have got something in your hands that's got a lot of information in it. What could you have in your hands that has a lot of information?

*Response:* A phone book.

*Matt:* A phone book, phone books good.

*Javier:* How convenient.

*Matt:* You guys need to stop looking at my props table, I need a drop cloth or something. So if I need to look up a phone number in here...

*Javier:* How many numbers do you think are in the phone book?

*Response:* A lot.

*Matt:* Well this is the Christchurch phone book right.

*Javier:* Science tells us there is more than a hundred.

*Matt:* Woah.

*Javier:* I know.

*Matt:* So this is the Christchurch phone book so there's going to be thousands of numbers in here right. It's the Christchurch phone book 2001. Awesome, so if I need to look up a number in here say I'm looking for my friend Mr J Smith, right. Ok how do I find his number through all these pages?

*Response:* Shortcuts by going to the last name and first letter.

*Matt:* Last name and first letter, but there's a lot last names in here still.

*Response:* They're ordered in alphabetical order.

*Matt:* They're all in alphabetical order.

*Javier:* Sorted.

*Matt:* So if I go to roughly about here, I start finding S's and then if I flick through a bit I find Smith's.

*Response:* Lots of Smiths

*Matt:* And then there is J Smith, just here.

*Javier:* There is like 50 J Smith's.

*Matt:* Yeah there is, in fact there is like two entire columns of J Smiths but I know that the J Smith I'm looking for is JA Smith who lives at 102 Halswell Junction Road and his number is 3229815.

*Javier:* Stalker. Is there a J Smith in the audience anywhere?

*Matt:* Do we have any J Smiths? You're J Smith?

*Response:* No.

*Matt:* No, why did you put your hand up 'shrugs' you just wanted attention. All right,

*Javier:* Who likes attention, its straightening his arm.

*Matt:* So if I'm looking for information I need it to be in sorted order.

*Javier:* But Matt when we have so many numbers, how do we get them sorted?

*Matt:* Well there is a whole lot of different ways, but what we are going to use is what's called a sorting network.

*Javier:* Is it time for the super fun Mat?

*Matt:* Its time Jarv, bring it out.

*Jarvier:* are you guys ready for the super fun mat?

*Response:* Yes.

*Jarvier:* Who's ready for the super fun mat?!

*Response:* Meee.

*Jarvier:* Well that was about half of you. Who's ready for the super fun mat!!

*Response:* MEEEE!

*Matt:* Yes, I'm super fun, look at me super fun!

*Jarvier:* Super fun mat, Matt help me with the super fun mat.

*Matt:* Ok I'll help you with the super fun Jarv.

*Jarvier:* Behold the fun!

*Matt:* Arrrrhhhh.

*Matt & Jarvier:* Arrrrhhhh.

*Matt:* Listen to those science noises going off in the audience.

*Jarvier:* Sorry

*Matt:* Jarv what have I told you?

*Jarvier:* It's a super fun mat, yeah.

*Matt:* it's a super fun mat.

*Jarvier:* Not a super love mat

*Response:* Laughing

*Matt:* Right I'm going to need six volunteers so let's start with J Smith, up the top.

*Jarvier:* Yes six volunteers.

*Jarvier:* Yes 2, 3, 4, 5 and 6 the very daper gentleman.

*Matt:* Alright, oh Man.

*Jarvier:* I want you guys to come and stand in a box over here.

*Matt:* That's some hot suit right there, oh wow, ok we are got a box just there.

*Jarvier:* Sir your box is right here.

*Matt:* Awesome, so what I've got here are a bunch of numbers right. I'm going to give you each a number alright.

*Jarvier:* You can see these in museums actually, they are lost to time.

*Matt:* Ok, so what's going to happen is these guys are going to travel through the super fun mat and when they reach the other end they will be in sorted order, alright. So how that is going to work?

*Jarvier:* Super fun.

*Matt:* Each of you is going to step forward along the blue line and stop when you reach a red box, alright. Go. Cool ok so the red boxes are comparing boxes so you need to compare your number with the number of the person standing next to you and I want you to put up your hand if you have got the higher number. The person who is standing next to you in the red box, so, you don't need to look at suit guy. Ok, Ok, that's cool so we've got three people who have the highest number, so higher numbers go right and lower numbers go left and just follow the blue lines. Ok so you are at another red comparing box again. So who's got the higher number out of these two?

*Response:* Me.

*Matt:* yup so if you've got the higher number, follow the blue line to your right and if you've got the lower number, follow the blue line to your left and you'll end up at another comparing box.

*Jarvier:* Guess what you do here? The same thing!

*Matt:* The same thing. So you've got the higher number, so you follow the blue line all the way to the end. Ok you've finished. Yeah so we've got the numbers. Call out your numbers.

*Response:* 1, 2, 3

*Jarvier:* Turn around and face the audience

*Response:* 4

*Matt:* Yes turn around and face the camera. Alright, so you are all in sorted order. How was that?

*Response:* Easy.

*Matt:* Easy, ok and what you will all have noticed is that when they were in those red boxes comparing their numbers there were three comparisons going on at the same time, which is how we speed things up in computer science. Sometimes we try and do as many things at the same time as possible. Alright so you guys know how to do that and that's sorting into order.

*Jarvier:* Hold on, I want to see them do it, do you guys think that you can, go back to the start.

*Matt:* Yup.

*Jarvier:* Go back to the start.

*Matt:* You think you can do it again?

*Jarvier:* I want to see how fast they can do it by themselves.

*Matt:* By themselves, alright.

*Jarvier:* Alright, so remember follow the blue line so you get to a box. When you get to a box you have to compare it with the other person in the box. If you have a lower number, where do you go?

*Response:* To the left.

*Jarvier:* Higher number?

*Response:* Right.

*Jarvier:* Ok keep it face down.

*Matt:* You are such a card shark.

*Jarvier:* Pick a disc, any disc, good ok, stopwatch ... oh you jum..beberbbberish.

*Matt:* You're not supposed to look at your cards.

*Jarvier:* Which translates to you're not supposed to look at your number. No you didn't. Alright ready? So I'm going to see how fast you can do it. Remember get to the box, compare and then move along the blue line.

*Matt:* Now remember guys, this is super fun so we want some enthusiastic audience noises.

*Response:* Cheering!

*Jarvier:* 3, 2, 1 GO! Oh you left someone behind. You can't leave someone behind.

*Matt & Jarvier:* Arrrrhhhhh

*Jarvier:* Someone's been left behind!

*Response:* Jordy Ahhhhh.

*Matt:* Sad audience noises.

*Response & Jarvier:* Ahhhhhhhh.

*Matt:* Again.

*Jarvier:* Stop.

*Matt:* Everyone run and give Jordan a hug and then go back to the start.

*Response:* Jordy.

*Jarvier:* Everyone go back to the start. Now the secret to this, is not to leave anyone behind ok.

*Matt:* So you can't leave a box until you've compared with your other person and they know where they're going. It's not enough that only you know where you are going. You've got to compare with the other person.

*Jarvier:* Ready? Go!

*Matt:* Enthusiasm! Go! Go!

*Response:* Cheering.

*Jarvier:* Turn around, turn around, read out your number please.

*Response:* 1, 2, 3, 4, 5, 6.

*Jarvier:* And in 14 seconds.

*Matt:* Ooooooh

*Jarvier:* Thank you very much, give me back the discs.

*Matt:* And you guys made a record!

*Tim Bell:* As you can see this is quite an engaging activity. In fact it can be fun to have competitions with teams against each other. Maybe the boys vs the girls. In this kind of activity, you find out in fact when they do work as a

team, because if they don't work as a team, often someone will get left behind or the final result is an unsorted list. If you are timing them against each other you may need to impose a penalty if they do that.