

# CALCULATING APPLE PIE

*by Melissa Keil*

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There's new graffiti scribbled on our porthole when I get back from my zero-G fencing class; neon writing, bright in the dark room, swirls across the window and blots out the starscape behind it. My sister loves decorating our pod with quotes and pretty art –vines and leaves curl all around the tiny space, in green NanoPaint that she's programmed to twinkle and sway.

We're allowed to do whatever we like inside our pods. It's mission command's way of maintaining the delusion that this ship is our 'home away from home.' But I know Arche's art is mostly to cheer me up. Today, in glowing emerald, my sister has written: The nitrogen in our DNA, the iron in our blood, the carbon in our apple pies, was made in collapsing stars. We are made of star stuff.

I flop into my bunk with a sigh. 'Good try, Arche,' I mutter. 'If we ever make it to our new home's borzy wasteland – I'll build a memorial to apple pies.'

After another day in middle-of-nowhere space, I'm tired and ready for a full-on glomp-out; but before I can get properly sulky, the pod lights flare, from evening gold to angry red, and the scream of the emergency siren tears through the ship.

It's the level-five alarm, the one where we're supposed to grab our evac kits and haul butt to the assembly points. It's the alarm that signals a catastrophic hull breach, an explosion in the ventilation chambers that means our air supply is toast. It's the We Are All Going to Die Horribly in the Cold Void of Space alarm.

And even though it has triggered approximately eighteen times since we set off on this voyage three-and-a-bit years ago, my heart seizes, then starts to gallop. Turns out, hurtling through space in a ship shaped like a beluga whale the size of a city block is dangerous, and kind of complicated.

The com panel on my wall pings, three pips and a bing. Masie's phoenix symbol swirls to life on the screen.

'Good evening, Kalyke!' chirps Masie in her singsong-y computer voice. 'Seems we've encountered a wee problem.'

Through the alarm shriek, shouting echoes on the other side of the pod door. A cavalry of heavy boots thunders down the corridor.

'Don't panic, Kal,' Masie says. 'I'm sure it's nothing to be concerned about!'

Which is pretty unhelpful since I am, in fact, panicking a lot.

The Migration Assistance and Shipboard Information Engine was designed as the ultimate low-key digital helper; normally, she's supposed to sound soothing and nondescript. But the computer's voice gave me the heebies when we first boarded, as bland as vanilla custard. So I dug into her operating code and tweaked her programming. Now, my Masie has an accent like my favourite BingSnap singer from back home in Colombo City, melodic and warm.

Mum laughed and said I'd programmed her to sound like me, which makes me seem a bit full of myself, even though it wasn't on purpose.

'Masie,' I yell through the ear-busting alarm. 'What is going on?!'

On the screen, Masie's phoenix wings still, her digital gaze turning outward. 'There seems to be a hiccup in the air filtration system,' she says, sounding mildly curious. 'Not to worry, Kal! I'm sure it will be resolved lickety split!' she adds cheerfully. 'You know the drill – make your way to location Sierra-E. Would you like some music for your travels?'

Masie's data banks contain pretty much all the music ever made. For some reason, she has developed a taste for an old-timey genre called 'folk rock'. She also likes to sing to me whenever I'm feeling particularly glompy.

I am not in the mood for music. I have shot to my feet, and though I know I should be hurrying to the emergency assembly point near the fitness centre, I am, instead, frozen in the centre of the pod. So when the door whizzes open and my sister flies into our room, she wallops straight into me and crash-tackles both of us to the floor.

'Jeez, Arche!' I yelp. 'Where's the fire?' And then I remember the screaming death-alarm, and the very real possibility that we might be about to asphyxiate in a space-fire, and my panic surges a dozen notches.

Arche jumps up and drags me to my feet. She grabs my arms, but whether it's to steady me or her, I couldn't say.

My normally calm, peaceable big sister looks totally flustered – the red emergency lights reflect in wild, wide eyes, her brown skin an awful shade of grey. She looks – well, a lot like me on a normal day in space.

'I think I've done something really borzy, Kal,' Arche yells over the alarm. She scrubs anxiously at the dark fuzz on her shaved head. 'Like really super ... bad.'

I blink, almost forgetting the red lights and screaming for a moment.

My sister does not do bad things. My sister is the gentlest soul in the system; happiest with her paints, or staring dreamily out our porthole and watching the stars go by, or weaving my long hair into thick braids. Unlike me, Arche loves everything, and complains about nothing. Also, Arche is a rule-follower; she's never even snuck into a grown-up VR dance club, which I know for a fact some of the older kids do.

I turned nine just before we set off. Arche was almost thirteen. There are two hundred and eighty-three other people on board the Panthalassa, the first Civilian Callisto Resettlement Wave – the very first community of migrants to call the embryonic moon outpost home. There are a few people my age, and a bunch of teenagers who Arche hangs out with in the VR cabins, and a heap of grown-ups and families who won a coveted place in the launch lottery. Three-and-a-bit years into the voyage, and everyone is still totally jazzed to be in space.

No one seems lost. And no one seems homesick.

Arche grabs my hands. I clutch hers back instinctively. 'Masie!' I yell, 'can you please lower the alarm? I know it's against protocol, but – we get the point!'

I swear, I hear Masie sigh. But then – praise all the gods – the alarm inside our pod fades.

I squeeze my sister's hands again. 'Okay, Arche – talk fast! What's happened? What ... did you do?'

Arche's whole face scrunches. 'I didn't think I did anything important! I was just ... fiddling. I was trying to help, for you, and I—'

Arche lets go of me. Then she whirls in a circle, sniffing the air like a puppy.

Arche is my favourite person in the solar system. Our parents are great, but kind of doofy (I mean, hello – they named their kids Arche and Kalyke, which says everything about their obsession with the Jovian missions). But even though my big sister has always dreamed of stars and adventures, she still gets me.

It's not that I'm not excited about this journey. It's just that going to something means leaving behind a bunch of other things. And all I can seem to feel is this blurry missing: all the people I will never see again, the places I'll never have a chance to go. I miss Colombo City, and Earth, with a ferociousness I didn't think possible. Arche adores the soft gold insides of the ship, but all that gold just makes me ache for the thousand shades of green in our Tree-Res community back home – no matter how much green Arche adds to our little pod.

My sister is currently still being mega doofy. 'Kal, I swear, I only made a tiny adjustment,' she squeals. 'Just a few lines of new code—' Arche sniffs again, and her dark skin goes even greyer. 'Can you smell that?' she whispers.

For three-and-a-bit Earth years, Arche and I have shared a room the size of our sonic shower back home, with our parents in a pod across the hall. Our room typically smells like thermo-dried clothing, and Arche's feet.

I raise my head and sniff cautiously.

The air does smell weird. But it also ... tastes weird? It tastes thick, like the ventilation system has kicked a bunch of extra aroma compounds into the room. It tastes like—

Arche fidgets fretfully with the sleeves of her dress.

‘Arche?’ I gasp. ‘What have you done?’

‘Oh my!’ Masie’s wings quiver, and she chirps, and bings, and chirps again. I think it’s her version of a laugh. ‘I believe we’re experiencing a particulate separation error in the air filtration system, caused by an overload in the D-Fac mainframe. Wowzingers! A snafu in the Dining Facility? That’s gonna to be a head-scratcher up on command deck.’

I take a big breath and suck in another mouthful of air. It’s changing, waves of weirdness wafting through the vents. It tastes like—

‘Tomato soup. And is that ...’ I stick my tongue out again, the air shifting from garlicky, salty warmth to tangy sour-sweet. ‘It is!’ I yell. ‘It’s lemon cheesecake!’

Arche buries her face in her hands. ‘I’m sorry, Kal! You’ve just been so sad, and I wanted to do something – it was meant to be a surprise! But you know I’m not great at complicated programming! I’m kind of jammy with my NanoPaints, but I suck at everything else—’

‘Arche – say that again? You did what?’

‘I added some code to the MFMT system,’ Arche says miserably. ‘We’ve always said that it’s missing a whole bunch of recipes, that they didn’t account for some of the special things people might crave. I thought I’d figured out how to add just one thing. For you ...’

‘Oh,’ I say. Then the full meaning of what she is saying reaches the comprehending part of my brain. ‘Oh no. Arche. You messed with the food fabricator code?’

The borziest thing of all about being in space? None of our food is real. It’s all engineered, state-of-the-art Molecular Fabrication and Modulation Technology, a fusion of edible 3D-printed atoms overlaid with a taste profile.

It’s ... fine, I guess. It’s nutritious. And it solved a few big problems of preserving and transporting enough food to keep hundreds of humans alive in space, cos even though they’ve been experimenting with terrafarming on Callisto, so far, they’ve only managed to grow, like, kale, and a few crops of sad-looking beans.

MFMT food almost tastes like what it’s supposed to. Most people will say that, if you didn’t know your dinner was fake, you wouldn’t be able to tell the difference.

But I can tell the difference. A collection of atoms, no matter how whizzy the programming, is still just atoms. Eggplant curry just doesn’t taste the same without our neighbour’s terrible singing as they stirred it at their stove; the earthy-sweet crunch of spices from Dad’s mortar-and-pestle can’t be replicated by an algorithm. Our food is fine, but there are a whole bunch of flavours that they just didn’t think to include. I know I was being a brat, but the first time I saw a salad sandwich materialise out of thin air inside a silica food chamber, I burst into tears. Arche tried to calm me down by stroking my hair and requesting wattalapam, but the machine didn’t have the code for that, just producing a sad puff of molecules that, for a moment, made the air smell like cardamom and nutmeg.

‘What were you trying to make?’ I manage to ask.

Arche sits heavily on my bunk. ‘Chicken curry. A proper one, like Dad used to make on weekends. Remember? The way it made the whole house smell yummy and coconutty, and how Dad always made a little super-spicy pot for Theo next door? The doofy runny stuff the fabricator spits out isn’t the same – even I know that.’

Masie’s wings vibrate merrily. ‘I believe Arche has made what is known as a gastronomic gaffe. A food fail. A snaccident. There is an amusing incident on file from the mid twenty-tens, a television program called Master Chef—’

‘Masie!’ Arche yelps. ‘Save the story for later, and tell us how we fix it! Is the ship in danger? And more importantly – how do we fix it?’

Masie chirps. ‘I don’t believe we are in danger. Probably not. Oxygen levels remain steady, by the look of things?’

Arche’s saucer eyes widen even more. ‘Don’t you know for sure?’

‘Weeeeell ...’ Masie’s wings shrug. ‘For some reason, they thought it was a bad idea to give me access to the ship’s core functionality. I hear the bots that manage life support are just swell though.’

‘Okay, okay! Everyone, calm down.’ I take a deep breath, getting a lungful of pavlova and spaghetti bolognese. ‘We can fix this. We just need to log into the D-Fac mainframe, and undo whatever Arche did.’

‘Easy-peasy,’ Masie says. ‘How do we do that, Kal?’

I ignore the probability that at any moment now, ship security – or worse, our parents – are going to realise that Arche and I are not where we're supposed to be. And I can't even consider the other nightmare scenario – that my sister has done permanent damage to our primary food supply, dooming almost three hundred people to starve to death in this whale-shaped deep-space tin can.

Instead, I force my brain to focus, unscrambling everything I know about the ship's systems, and the ways they are interlinked.

I drop down in front of Masie and push the wall beneath her screen. A gold panel, overlaid with a twinkly sketch of a fern, opens. Beneath it is an emergency control console and a keyboard.

Masie bips uncertainly. 'You know it's against my protocols to spy, Kal. But you are going to be late for the evac headcount. And I am supposed to alert command if any passengers are putting themselves at risk.'

'Masie,' I say, tapping at the keyboard, 'Can't you just ... look the other way for a sec?'

'Excellent idea!' Masie says. 'Can't report on what I can't see!' Her phoenix flickers, then flips around. A plummy tail flaps in our direction. She also starts to hum, loudly.

I sit cross-legged in front of the keyboard, the ship whirring through my body, the alarm howling in the distance, the taste of mint milkshake and pepperoni pizza on my tongue.

Arche kneels beside me. 'Kal, we can't log into the ship's systems from our bedroom. Can we?'

I grimace. 'Um, normally, no. We're just supposed have access to school stuff. Music and old BingSnap videos. Games ...'

Arche nudges my arm. 'But?'

'Well, I might have ... installed a remote tool that modifies our access? And it might've let me ... hack into all of the ships operating systems?'

Arche's jaw drops. I tell my sister pretty much everything, but not even she knows that I've been messing around with this.

'It's nothing dangerous, I promise!' I add quickly. 'Mostly I've just been ... keeping an eye on things. Monitoring the navigation deck and making sure they're not piloting us into a comet or something.'

The mission command grown-ups seem to think that the rest of us should be happy just hunkering down with entertainment, and not sweating the details of the journey. It's doofy, I know, but information – learning how the Panthalassa functions, and keeping up-to-date on how she's running – is just about the only thing that helps me feel less like a barnacle. It's the only thing that stops me feeling so powerless.

Arche shakes her head. 'Kalyke, you and I are going to have a proper talk later. But – can you fix this?' She wafts a hand through the air, which now tastes like Singapore noodles covered in clam chowder. 'Kal! What if I've actually broken something for good? Dad and Amma are going to flip out. I'm in so much trouble!'

'No, you're not,' I say, typing furiously. 'As long as we can get into the fabricator system before anyone notices we're missing. I can fix it, Arche,' I say with as much confidence as I can muster. 'We just need to think about how the system should be working, then find the place where your code is making it do something else.'

I'm pretty jammy at all kinds of programming, but it's never actually occurred to me to mess with food production, no matter how badly I've been longing for a taste of home. Not even I would be that reckless.

I glance sideways at my sister's freaked-out face. And I turn back to the console and straighten my spine.

I have to fix this. And not just to save Arche. I might be all that stands between the two hundred and eighty-three souls on board the Panthalassa and a slow, agonising famine, a nightmarish, drawn-out starvation disaster—

'Oh – okay! Here it is!' I say triumphantly, almost tripping headfirst into the D-Fac mainframe and through to the fabricator's data-access layer.

Arche squints at the screen. 'Really? Just like that?'

Masie chirps. 'Yeah, it's not super protected, kids. Obviously, mission command didn't think the burger-and-fries dispenser was a top security priority.'

My hands freeze on the keys. I could search for Arche's errant code, but tracking it down might take ages. Meanwhile, the alarm still screams in the background; and I half expect our parents to start hammering on our pod door, cos by now they must surely have made their way from their swing dance class; and the ship technicians have got to be honing in on the problem, which my sister has probably left digital fingerprints all over; and who knows what lasting harm the overload is causing to the D-Fac hardware; and Arche looks like she's about to puke all over the gleaming gold floor.

I think for a moment. Then I fire off a few hasty but precise commands, and reset all of the Dining Facility's systems to last week's emergency backup.

The alarm dies.

The pod lights return to evening gold.

I run my eyes anxiously over the MFMT interface, but there are no error codes or bugs that I can see. The food production system looks like it's ... just fine.

Masie peers down at us, the face of her phoenix squished against the screen. 'Well. That was exciting. Nice one, Kal!'

Arche and I scoot away from the console. We both seem to be holding our breath, but there's no sudden pounding on our door, no security alert or furious Amma-face on Masie's com screen.

I collapse against my sister. And even though my heart is still racing, I start to laugh.

'I can't believe you did that, Arche,' I say through snorts. 'You, who've never even tried the hack that turns oatmeal into breakfast chocolate!'

Beside me, Arche she starts to giggle as well. 'How was I supposed to know that state-of-the-art tech designed for deep space would be so complicated?' She wipes a shaky hand over her eyes. 'But, oh. I really did want that chicken curry, Kal. You ... know you're not the only one who's missing things. Right?'

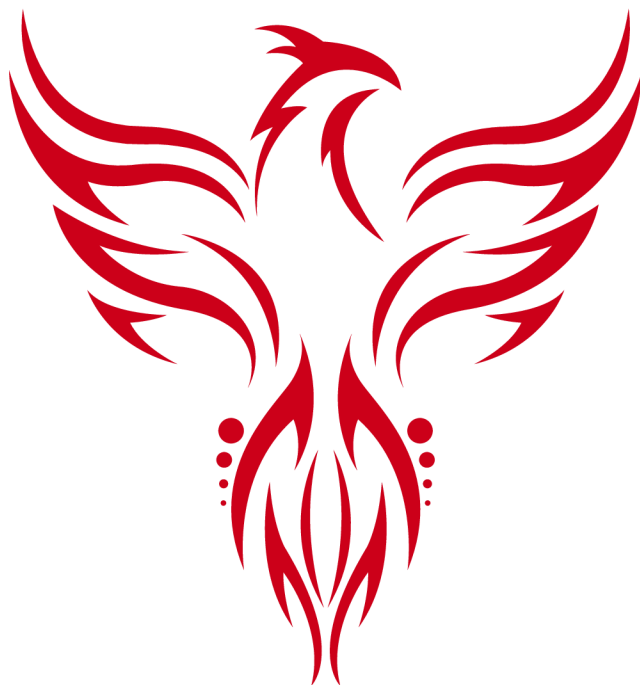
I lean my head against Arche's shoulder. Around us, her jungle-green artwork twinkles and sways, a tiny reminder of the home that's receding ever further behind us.

'Thank you for trying, Arche. Maybe we can give it another go sometime? Proper chicken curry can't be that hard to code. We just might need to do some research first.'

I sit side by side with my sister, our backs against the porthole, the neon graffiti and the endless expanse of stars, the taste of syrupy pancakes fading on our tongues.

Then my tummy growls, reminding me that it's probably time to venture outside our little room.

'Hey, Arche? Do you want to get dinner? I'm suddenly really hungry.'



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See you in the future!

**FUTURE**  
***you***

