**TSARIN BABBAR MANHAJAR *ANDROID***

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**Gabatarwa**

Shekaru biyar da suka gabata a Najeriya da sauran kasashe masu tasowa, an samu bayyanar wata sabuwar babbar manhajar wayar salula da tsarinta da kintsinta suka sha bamban da wadanda aka saba gani da mu’amala dasu, irin babbar manhajar *Symbian (S60* da *S40)* da *Java* da kuma *Asha* da ta bayyana daga baya. Wannan bakuwar babbar manhaja da ta bayyana ta hanyar wayoyin kamfanin *Tecno* da *Samsung* da *Sony* da *Motorola* kuwa, ita ce: Babbar Manhajar *Android* ko *Android Operating System* a harshen kimiyyar sadarwar zamani. Sadda wannan sabuwar babbar manhajar wayar salula ta fara bayyana ko zuwa a wasu wayoyi na zamani (Smartphones), da yawa cikin mutane sun yi farin ciki sosai. Domin saukinta da kyaun siffarta sun kayatar dasu matuka, sannan ta basu damar isa gidajen yanar sadarwa cikin sauki sanadiyyar ingantaccen tsarin sadarwa na Intanet da take dauke dasu. Da wayoyi masu dauke da wannan babbar manhaja ta Android suka ci gaba da shigowa, sai jama’a suka fara tambayar bambancin dake tsakaninta da sauran manhajojin wayoyin salula dake dauke cikin wayoyin Nokia (kamar *Symbian,* da *Asha* da *Windows Phone).*

Shafin Kimiyya da Kere-kere ya sha samun tambayoyi kan haka da yawa a baya. Kasancewar a bangaren tambayoyi ne kadai nake amsa su, wanda hakan ke nufin bayanan a takaice suke zuwa, yasa na ga dacewar rubuta kasida ta musamman don samun gamsarwa ga masu bukata.

Kalmar *Android* ta shahara a bakunanmu, musamman a Arewacin kasar nan. Wasu matasa ma har bagu suke; idan wayarka ba *Android* bace, ka zama bakauyen birni. To amma, wannan kalma ta *Android* me take nufi? Wa ya samar da wannan babbar manhaja mai matukar tasiri a duniyar yau? Shin, wai ma ita babbar manhajar *Android* nau’i daya ce? In a a, meye bambancin dake tsakaninsu? Sannan, a na’urar wayar salula kadai ake samun babbar manhajar *Android?* In a a, wasu na’urorin sadarwa ko na’urorin amfanin gida suke amfani da babbar manhajar *Android?* Ba wannan kadai ba, wa ke gina manhajoji ko masarrafan (Applications) dake cikin Android ta hanyar *Play Store?* Yaya ake gina su? Shin, idan mai karatu yana son gina ire-iren wadannan manhajoji, shi ma zai iya? In eh, wasu hanyoyi zai bi wajen gina manhajoji ko masarrafan (Applications) da za a iya amfani dasu a wannan babbar manhaja? Wasu kayayyakin aiki yake bukata wajen yin haka? Kuma yana bukatar dole sai ya je makaranta an koya masa, ko dai zai iya alkafira kawai ya kama ginawa ta hanyar karatu da kwatantawa? Idan kuma ya gama gina manhajarsa, ta wace hanya zai dora ta a kan wannan Cibiya ta *Play Store?* Shin, a cibiyar *Google Play* ko *Play Store,* akwai manhajoji da aka gina cikin harshen Hausa? Wadannan, da ma kari akansu, su ne abin da wannan kasida za ta duba, ta hanyar bincike mai zurfi, a aikace, don baiwa mai karatu samun gamsuwa. A halin yanzu za mu fara da bayanin “Asali da Tarihin Babbar Manhajar Android” a duniya.

**Asali da Tarihin Android**

Idan aka ce: “Android” ana nufin wata babbar manhajar wayar salula ce da wata kungiya mai suna: *Open Handset Alliance (*[*www.openhandsetalliance.com*](http://www.openhandsetalliance.com)*)* ta gina kuma take lura da ita, tare da bayar da lasisin amfani da ita ga masu kera wayoyin salula, da ka’idojin da za su bi wajen kayatar da manhajar, don sayarwa ga jama’a. Asalin madarar wannan babbar manhaja *(Operating System Kernel)* ana tafiyar dashi ne a tsarin “Bude ga kowa” *(Open Source).* Abin da wannan ke nufi shi ne, idan kai masani ne a fannin dabarun gina manhajar kwamfuta da wayar salula ko na’urorin sadarwa, kamfani kake ko gama-garin masani ne kai mai zaman kansa, za ka iya saukar da asalin madarar wannan babbar manhaja ta Android *(Android Source Code)* kyauta daga shafin kungiyar *Open Handset Alliance (OHA)*, ka inganta, ka tsara, sannan ka kayatar da ita daidai da ka’idojin dake dauke cikin kundin *Google* mai take: *Compatibility Test Suite (CTS).*

An kafa wannan kamfani na *OHA* ne a ranar 5 ga watan Nuwamba, shekarar 2007. Jagorar wannan gamayya shi ne kamfanin *Google Inc.,* wanda shi ne ya sayi asalin babbar manhajar Android daga kamfanin *Android Inc.*  Daga nan ya kafa wannan kungiya don hada karfi da karfe tare da bunkasa wannan babbar manhaja a tsarin “Bude ga kowa.” Wannan kungiya ta *OHA* na dauke da mambobi 80 ne a halin yanzu, shahararru daga cikinsu su ne: *Google,* da *Samsung,* da *HTC,* da *Motorola,* da *LG,* da *Sony,* da *Texas Technologies,* da *Dell,* da *Intel,* da *Nvidia,* da *Qualcomm* da sauransu. Wadannan kamfanoni ne da suka yi dumu-dumu a fannin kera wayoyin salula, ko masarrafar wayar salula, ko kwamfutoci da sauran makamantansu. Babbar manufarsu dai, kamar yadda yake rubuce a shafinta, shi ne samar da wayoyin salula ko na’urorin sadarwa masu kayatarwa, masu karancin cin makamashin batir, kuma masu sauki ga jama’a.

Kafa wannan Kungiya ya zo daidai da lokacin da kamfanin *Nokia,* shahararren kamfanin kera wayoyin salula na duniya a lokacin, wanda ya kwashe shekaru sama da goma yana rike da kambin shugabanci a fannin kerawa da tallatawa da sayar da wayoyin salula masu inganci, ya kwace kasuwa, yayi kane-kane; ba wanda ke iya motsawa, idan ka kebance kamfanoni irin su *Samsung,* da *Sony(Ericsson)* da *Motorola,* a lokacin da yake yayi. Babbar kalubale da sauran kamfanoni suka fuskanta kafin bayyanar babbar manhajar Android a wayoyin salula shi ne: saye kamfanin *Symbian Inc (*wanda a baya shi ne ke baiwa sauran kamfanoni lasisin ginawa da kayatar da babbar manhajar *Symbian* a wayoyinsu) da kamfanin *Nokia* yayi, don yin babakere a kasuwar baki daya. Wannan yazo daidai da lokacin da kamfanin *Google* ya sayi wannan babbar manhaja ta Android a shekarar 2005, da kuma kafa kungiyar *Open Handset Alliance* da aka yi daga bisani.

Daga nan kamfanin *Nokia* ya fara samun kishiya mai tasiri, wanda a karshe hakan ya tilasta masa komawa don yin kawancen kasuwanci da kamfanin *Microsoft* da ke gina babbar manhajar wayar salula mai suna *Windows Phone.* To amma kafin ya fadaka, tuni wadancan sauran kamfanoni kawancensu da *Google* tayi nisa, tayi karfi har ta fara haifar da tasiri mai inganci da a karshe hakan ya basu damar kwace kasuwar gaba daya daga kamfanin *Nokia.* A halin yanzu kamfanin dake tashe a duniya wajen yawan adadin wayoyin salula, da kayatattun manhajojin waya, shi ne kamfanin *Samsung.* A halin yanzu duk inda ka san ana jera sunayen kamfanonin wayar salula a duniya, za ka samu kamfanin *Samsung* ne a gaba. Meye dalili?

**Bunkasar Manhajar Android**

Wannan babbar manhajar wayar salula ta Android na dauke da siffofi masu kayatarwa ainun. Galibin siffofinta suna magance bukatun dake kunshe cikin dabi’ar dan adam ne wajen son sauki, da son kwalliya, da son rahusa wajen farashi, da son sauri ko gaggawar aiwatar da abubuwa, da kuma bayar da kariya don rage hadari da hasarar duniya ko lokaci. Ba wannan kadai ba, hatta asalin madarar babbar manhajar ma, idan muka koma bangaren kwararru masu gina manhajar waya da kwamfuta, kyauta ake basu ita; su yi nazari, su gina, su habaka, su inganta, sannan su kayatar iya gwargwadon ka’idojin da kamfanin *Google* ya assasa. Kai, saboda saukin ya kai matuka ma, akwai kamfanonin da suke canza duk abin da suke bukata, su ki bin ka’idar kamfanin *Google* wajen caccanza abin da suke so, kuma sun sha Kenan. Illa dai ba su da damar sanya kowace manhaja ta kamfanin *Google* ne kawai.

Bayan wadannan siffofi, masu gina babbar manhajar wayar salula *(Developers)* suna gina manhajoji ko masarrafai na kyauta da na kudi (ga mai bukata). Bayan sun gina, suna iya dora su a Cibiyar Masarrafai *(Play Store* ko *Google Play)* dake dauke a saman wannan babbar manhaja da wayoyi ke zuwa da ita. Ga masu mu’amala da waya mai dauke da Android, suna iya saukarwa *(Downloading)* da kuma loda *(Installing)* wa wayoyinsu wadannan masarrafai kyauta ko su saya idan suna bukatar karin fa’ida ga masu dauke da karin fa’idar. Sannan Android na dauke da tsarin kira, da amsa kira, da daukan hotuna, da bidiyo, da kyatar dasu, da daukan sauti, da taskance lambobi da sauran abubuwa masu kayatarwa, fiye da bukatar mai wayar ma, musamman mu dake kasashe masu tasowa.

Kari a kan haka, waya mai dauke da babbar manhajar Android na dauke da manhajojin kamfanin *Google* masu dimbin yawa, tunda shi ne mai asalin manhajar. Wadannan masarrafai sun hada da: *Google Search, da Google+, da Gmail, da Google Maps, da Google Play ko Play Store, da Google Chrome, da Play Newsstand, da Games, da Hangout, da Youtube, da Play Music, da Voice Search, da Google Drive.* Wadannan kadan ne daga cikin manhajojin kamfanin *Google* dake dauke a kan babbar manhajar Android.

Samuwar wadannan siffofi ya bunkasa kasuwa da kwarjinin Android a duniya baki daya; daga gabas zuwa yamma, daga kudu zuwa arewa, har da tsakiya baki daya. An wayi gari, bayan wayar salula mai dauke da Android, akwai Android a na’urorin sarrafa bayanai (irin su *Tablets)* da Android a talabijin na zamani *(Android TV),* da Android a motocin hawa *(Android Auto),* da kuma Android a cikin agogon hannu *(Android Wear).* Wadannan su ne nau’ukan manhajar Android da ake dasu a duniya a halin yanzu. Abin da kuma hakan ke nuna shi ne, ba wayar salula bace kadai ke iya zuwa da babbar manhajar Android, a a. Talabijin ma na zuwa da ita. Agogon hannu ma na zuwa da Android. Sannan a halin yanzu akwai motocin hawa na zamani da ake kera su dauke da babbar manhajar Android dake taimakawa wajen nuna musu hanya da taswira da gano matsalolin da mai tuki zai iya cin karo dasu na mummunar yanayi da sauransu. Wannan ke nuna yadda wannan babbar manhaja ke habbaka da bunkasa.

Idan muka koma bangaren kasuwanci kuma, ya zuwa shekarar 2013, alkaluman bayanai sun tabbatar da cewa: babbar manhajar da wayoyin salula suka fi amfani da ita a duniya yanzu ita ce Android. Sannan an fi sayen wayoyin salula masu dauke da babbar manhajar Android fiye da nau’in *Windows* da *iOS* da kuma *Mac OS X.* Har wa yau, an tabbatar, ta hanyar binciken ilimi da kididdiga, cewa adadin wayoyin salular da aka sayar a duniya tsakanin shekarar 2012, da 2013 da kuma shekarar 2014 da muke ciki, sun kai adadin kwamfutocin da ake amfani dasu, masu rai, a duniyar yau! A watan Yuli na shekarar 2013, an kiyasta cewa Cibiyar Masarrafai na Android, wato *Play Store* ko *Google Play* na dauke ne da masarrafai wajen miliyan daya! Zuwa karshen shekarar 2013 din dai har wa yau, adadin masarrafan da aka saukar dasu kan waya daga Cibiyar *Play Store* sun kai biliyan 50! A nasa bangaren kuma, wani maginin manhajar wayar salula mai zaman kansa, ya tabbatar da cewa kashi 75 cikin 100 na masu gina manhajar wayar salula a duniya suna gina wa babbar Manhajar Android ne. A taron shekara-shekara da yake yi don fadakar da masu gina manhajar kwamfuta mai take: *Google I/O* na shekarar 2014, kamfanin *Google* ya sanar da cewa a duk wata ba a rasa a kalla wayoyin salula masu dauke da manhajar Android guda biliyan daya a duniya! Dankari! Lallai abin na yi ne!

**Zubin Babbar Manhajar Android**

Abin da kalmar kalmar “Zubi” ke nufi shi ne *Version,* kamar yadda yake a harshen Turanci. A harshe mai saukin fahimta, “Zubin Android” na nufin nau’in kare-karen da ake wa babbar manhajar ne lokaci zuwa lokaci, don habbaka ta, da ci gaba da lura da yadda jama’a ke mu’amalantarta, da irin kalubalen da suke fuskanta in akwai, da yadda za a toshe ko gyara wadannan matsaloli. Zubin farko *(Version 1.0)* na Android ya fito ne a shekarar 2008 cikin watan Satumba, amma Kungiyar *OHA*  bata masa wani lakabi ba, duk da cewa ana kiran wannan zubi da “Android Alfa,” sabanin yadda aka saba yi a wannan fanni. Haka ma zubi na biyu *(Version 1.1)* wanda ya fito a watan Fabrairu na shekarar 2009, shi ma babu wani lakabi da aka masa, duk da cewa shi ma akan kira shi “Beta,” wanda hakan ke nufin: “Manhajar da ake kan aiki akanta” ne, ba wani lakabi bane na musamman.

Kungiyar *OHA* ta fara yi wa zubin Android lakabi ne daga kan Zubi na uku *(Version 1.5)* wanda ta fitar a watan Afrailu na shekarar 2009*,* inda ta masa lakabi da “Android CupCake.” Sai Zubi na hudu *(Version 1.6)* da aka fitar a watan Satumba, duk dai cikin shekarar 2009, mai lakabin “Android Donut.” Zubi na biyar *(Version 2.0 – 2.2.1)* da ya fito a watan Oktoba, wata guda bayan bayyanar zubi na hudu,an masa lakabi ne da “Android Éclair.” Lakabin “Android Froyo” shi ne Zubi na shida *(Version 2.2 – 2.2.3)* kuma Kungiyar OHA ta fitar dashi ne a watan Mayu na shekarar 2010. Zubi na bakwai *(Version 2.3 – 2.3.7)* shi ne “Android Gingerbread” da ya fito a watan Disamba na shekarar 2010. Sai Zubi na takwas *(Version 3.0 – 3.2.6)* mai lakabin “Android HoneyComb” da aka fitar a watan Fabrairu na shekarar 2011. A Zubi na tara *(Version 4.0 – 4.0.4)* ne aka samu “Android Ice Cream Sandwitch.” Shi kuma ya fito ne a watan Oktoba na shekarar 2011 din dai har wa yau.

A cikin watan Agusta na shekarar 2012, kwatsam sai ga Zubi na goma *(Version 4.1 – 4.3.1)* wanda akai wa lakabi da “Android Jelly Bean,” kuma shi ne ke dauke a kan kashi 50 cikin 100 na wayoyin Android a duniya a yau, kamar yadda kamfanin *Google* ya tabbatar kwanakin baya. Zubi na goma shadaya *(Version 4.4 – 4.4.4)* shi aka yi wa lakabi da “Android KitKat.” An fitar da “Android KitKat” ne a watan Satumba na shekarar 2013. Wannan zubi ba dai kyau ba. Ba dai kayatarwa ba. Iya makurar kwalliya da ado ya kare masa.

Amma sai dai kafin ya gama game duniya kuma, Zubi na goma shabiyu *(Version 5.0)* ya riske shi. Wannan zubi, mai lakabin “Android Lollypop” an fitar dashi ne ranar 3 ga watan Nuwamba na wannan shekara (2014). Sai dai, kamar yadda aka saba a al’adance, wayoyin kamfanin *Google* ne kadai ke dauke da wannan zubin babbar manhaja na Android mai lakabin “Android Lollypop” a halin yanzu. Sauran kamfanonin waya za su biyo baya nan ba da dadewa ba. Wayoyin kamfanin *Google* da suka zo da wannan zubi kuwa su ne: *Google Nexus 6,* da kuma na’urar sarrafa bayanai mai suna *Google Nexus 9 Tablet.*

Wadannan nau’ukan zubi na babbar manhajar Android da bayaninsu ya gabata, kamfanin *Google* ne ke tabbatar da sauye-sauye cikin asalin madarar babbar manhajar, sai ya fito dasu cikin wayoyinsa jerin *Nexus.* Bayan haka, sai sauran kamfanonin kera wayar salula kuma su karbi asalin madarar zubin babbar manhajar su sauya shi yadda zai dace da manufofinsu na kasuwanci, kamar yadda bayani ya gabata.

**Manufar Gina Android**

Dukkan kamfanonin da ke kera wayoyin salula, da kwamfutoci, kai da ma dukkan wata na’ura ta sadarwa, suna da manufofi da suka kudurta a yayin da suke ginawa ko tsarawa ko kayatar da manhajar ko na’urar. A bangaren Kungiyar *OHA,* kafin ta fara tunanin gabatar wa duniya wannan babbar manhaja ta Android, sai da ta duba wayoyin salula da ake amfani dasu a wancan lokaci (2005/2006), da irin matsaloli ko kalubale da su kansu wayoyin ke fuskanta wajen gudanar da ayyukan da aka kera su don su gudanar. Sannan suka dubi wani irin kalubalen da masu mu’amala da wayar salula suke fuskanta.

Abu na farko da kungiyar ta lura dashi kuwa shi ne, wayoyin salula (tun farkon samuwarsu har zuwa yau) suna amfani ne da makamashin batir mai dauke da sinadaran dake samar da karfin wutar lantarki, don basu damar aiwatar da ayyukansu. Kuma babbar matsalar masu amfani da wayar salula, bayan kudin sayan katin waya, shi ne rashin ingancin batir. Ma’ana, makamashin batir ba ya dadewa na tsawon kwanaki ana amfani dashi, sai ya kare. Sai kuma suka fahimci cewa kafin a kai lokacin da kamfanonin kera batiran wayoyin salula za su kara ingancin wadannan batira kuwa, za a dauki tsawon zamani. Tunda abu ne dake bukatar dogon nazari, da tsaban kudi don sayen kayan aiki da gudanar da bincike, kafin sinadaran da za su kara wa batira inganci da kuzari da tagomashi su samu. Don haka sai Kungiyar *OHA* ta tsara yadda babbar manhajar Android za ta iya kintsa kanta da daidaita aikinta iya gwargwadon yadda kwarin batir yake.

Misali, idan batirin wayar salula a cike yake fal, za ta gudanar da aikinta a cike, ko iya yadda mai wayar ya tsara ta. Idan batirin rabi ne, za ta rage karfin cin makamashi da kanta. Idan mai wayar ya tsara ta ne iya makura, akwai wasu hanyoyin da aka tanada masa da zai iya latsawa don rage karfin dukkan masarrafan dake cin makamashi da yawa (kamar tsarin *Power Saving* misali). A takaice dai, akwai manufar ragewa ko iya manejin makamashin waya yayin da ake tsara babbar manhajar Android.

Wannan ya saba wa wayoyin salula na zamanin da, wadanda sai abin da aka baka za ka yi aiki dashi. Tabbas akwai wasu wayoyin dake da hanyoyin rage karfin hasken fuskar waya, da kashe wasu manhajoji, amma hakikanin manhajar tana nan yadda take. Amma Android, akwai sadda idan ka kai makura wajen aiki da makamashi, alhali ga batirinka ya yi kasa, da kanta za ta rage yawan abin da kake kwankwada na makamashi, ta kuma sanar da kai cewa: “Akwai alamar batirinka yayi kasa, don haka waya za ta rage karfin aikinta don baka damar ci gaba da amfani da ita.” In da wayoyin salula na zaman baya ne, sai dai kawai ka ga ta mace!

Na biyu, Kungiyar *OHA* ya sake nazarin wayoyin salula, sai ya lura cewa tunda kanana ne, hakan na nufin suna da kananan ma’adana kenan (Memory ko Storage). Ma’ana, ba kamar kwamfuta suke ba wajen girman ma’adana da ingancinsu. In kuwa haka ne, ashe idan aka cike su da manhajoji (Apps) musamman na wasanni (Games), za su yi nauyi matuka, su kasa aiwatar da ayyukansu yadda ya kamata. Domin cibiyar da ke sarrafa umarnin mai mu’amala da wayar, wato *Processor,* zai zama a shagalce fiye da yadda aka tsara shi. Kafin mai karatu ya kasa fahimtar lamarin, ga misali. A duk sadda ka latsa wata manhaja a fuskar wayarka, umarni ne kake baiwa wayar. Nan take za ka ga an aiwatar. Iya karancin lokacin da aka dauka wajen aiwatar da umarninka, iya karfin cibiyar dake sarrafa sakonni ne da kuma girman ma’adanar dake wayar. Amma idan ya zama duk sadda ka latsa wata alama ko maballi a jikin waya, sai an yi kamar dakika uku (3 seconds) kafin a aiwatar da umarninka, to, ka san akwai matsala kenan. Da Kungiyar *OHA* ta lura da haka, sai ta tsara babbar manhajar Android ta yadda za ta iya jure nauyin lodin umarni, da taimaka wa cibiyar sarrafa umarni *(Processor)* gudanar da aikinta. Ma’ana, akwai alaka ta taimakekeniya a tsakanin babbar manhajar wayar, da gangar-jikin wayar kenan.

A karo na uku, Kungiyar *OHA (Open Handset Alliance)* ta sake lura da su kansu nau’ukan masarrafan da ake loda wa wayoyin salula, sai ta ga su ma suna da alhaki wajen janye wa wayar salula makamashinta na batir. Kenan ashe ba tsantsar aikin gangar-jikin wayar bane kadai ke cinye batirin, har da masarrafan da mai waya ke loda su. Wannan ya sa Kungiyar ta samar da ka’idojin gina manhajojin dake aiki a kan babbar manhajar Android. Wadannan ka’idoji ta samar dasu ne ta hanyar tsarin *Application Programming Interface (API),* wanda tsari ne da duk wani mai son gina masarrafar da za ta yi aiki a kan babbar manhajar Android, dole sai ya kintsa su cikin dabarun da yake amfani dasu wajen gina masarrafar, sannan za a iya aiki da ita a kan babbar manhajar Android.

Wadannan tsare-tsare dai kalmomi ne, ko hadakar kalmomi na yaren kwamfuta, wadanda suka kebanci Android. Ilimi ne mai zurfi, ya jama’a. Asali, galibin masarrafan dake Cibiyar *Play Store* an gina su ne da dabarun gina manhajar kwamfuta mai suna *JAVA.*  Ita kuma babbar manhajar Android asalinta daga dabarun gina manhajar kwamfuta mai suna *C* ne da *C++.* Kenan ashe dabaru ne mabanbanta. Idan kana bukatar tsara maballin da mai mu’amala da wayar salula zai latsa don aiwatar da wani aiki, dole ne kayi amfani da yaren da babbar manhajar Android ke iya fahimta, wanda kuma musamman aka samar dashi don yin hakan, ka cakuda shi da na JAVA, sannan ta fahimci yaren. Nan gaba akwai bayani dake tafe kan wadannan ka’idoji da tsare-tsare. Abin nufi dai shi ne, manufar masu babbar manhajar Android shi ne samar da masarrafan da za su zama masu karancin cin makamashi a yayin da ake aiki dasu a kan babbar manhajar.

Manufa ta karshe, Kungiyar *OHA* ta sake kallon wayoyin salula don nazarinsu, sai ta tarar akwai matsala da masu gina masarrafai ke cin karo da ita tsakanin wayoyin salula na kamfanoni daban-daban, da kuma nau’i da kintsin shafukan wayoyin. Abin nufi, idan kana son gina manhajar wayar salula, dole a baya sai ka haddade nau’in wayar da za ta iya amfani da manhajar, da kuma girman fuskanta *(Screen Siz and Orientation)*. Kenan ashe idan kana son gina masarrafan da kowace waya mai dauke da babbar manhaja iri daya za ta iya amfani da ita, dole sai ka gina masarrafai iya yawan nau’ukan wayoyin da kake so su iya amfani da ita. Da Kungiyar *OHA* ta lura da haka, sai tace akwai matsala. Nan take ta tsara hanyoyin da masu gina masarrafar wayar salula *(Mobile Phone Developers)* za su iya amfani dasu don gina manhaja guda daya tak, wacce za a iya amfani da ita kan kowace irin waya ce, na kowane irin kamfanin waya, mai karamin fuska ce ko babba, in dai tana amfani da babbar manhajar Android. Tirkashi! Wannan manufa na cikin manufofin da suka kara wa babbar manhajar Android shahara, da tunbatsa, da kuma saurin yaduwa a duniya.

**Nau’ukan Android a Wayoyin Salula**

Bayan bayanai da suka gabata kan nau’ukan manhajar Android dake na’urorin sadarwa mabanbanta, wannan sashe zai dubi nau’ukan manhajar ne dake kan wayoyin salula. Shin, manhajar Android iri daya ce a dukkan wayoyin salula da ake sayarwa yanzu? Nau’in manhajar Android dake wayoyin Tecno (ba zubin manhajar nake nufi ba, wanda bayaninsa ya gabata a baya), iri daya ce da wadda ke kan wayoyin kamfanin Samsung? Wadda ke kan wayoyin LG, iri daya ce da wadda ke kan wayoyin Sony, misali? Amsar ita ce: a a; nau’uka ne daban-daban. Sai dai akwai abin da ya hada tsakaninsu, duk da cewa sun sha bamban ta bangarori da dama. Domin idan ka dauki wayar Tecno mai dauke da Android, ka gwama abin da ke bangaren *Menu* dinta da ta kamfanin Samsung mai dauke da Android, za ka ga akwai banbanci.

Akwai nau’ukan manhajar Android guda biyu dake kan wayoyin salula dai a halin yanzu. Nau’i na farko shi ne hakikanin babbar manhajar, kamar yadda aka gina ta ko ake kayatar da ita daga kamfanin Google ko Kungiyar *Open Handset Alliance (OHA).* Wannan nau’i shi ake kira *Android Open Source Project (AOSP).* Kuma shi ne nau’in da kamfanin Google ke fitarwa a dukkan wayoyinsa. Idan kana son ganin nau’in manhajar Android ta asali, wacce babu gauraye a cikinta, to, ka samu wayoyin kamfanin Google masu suna *Google Nexus;* kowane irin nau’i ne kuwa. Bayani kan yadda asalin manhajar yake kuwa yana tafe a sashen dake gaba.

Nau’in manhajar Android na biyu kuma shi ne wanda sauran wayoyin salula ke amfani dashi a kan wayoyinsu. Shi ma ba wani abu bane daban, asalin wancan nau’in ne da bayaninsa ya gabata, sai kuma kare-kare da kamfanonin waya suke yi a kansa, don manufofinsu na kasuwanci. Wannan nau’i shi kuma ya karkasu ne iya yawan kamfanonin dake dora Android a kan wayoyinsu. Ma’ana, ba za ka taba samun wayoyin salula guda biyu masu dauke da manhajar Android masu siffofi iri daya ba, ta kowane bangare. To meye abin da ya hada tsakaninsu, sannan me ya raba tsakaninsu?

Abin da ke hada tsakanin dukkan manhajojin Android dake wayoyin salula na duniya kuwa shi ne, asalin babbar manhajar daya ce. Idan kamfanin Google ya kintsa manhajar ya fitar a wayoyinsa, sai sauran kamfanoni su karbi madarar babbar manhajar *(Operating System Source Code)* su ma su dora a kan wayoyinsu. Idan ka shiga bangaren *Settings* dake kowanne za ka ga kusan daya ne. Haka ma dabi’unsu wajen kunnawa da kashewa da mu’amala da fuskar wayar *(User Interface),* a wasu lokuta. Wannan abin da ke hada tsakaninsu kenan.

A daya bangaren kuma, sauran kamfanonin waya idan suka karbi madarar babbar manhajar *(Operating System Source Code),* suna caccanza abubuwan da ake iya canzawa ne daga asali, zuwa abin da ya dace da manufofinsu na kasuwanci. Shi yasa idan ka shiga bangaren *Menu,* za ka samu masarrafai *(Apps)* mabanbanta. Na kamfanin Samsung sun sha banban da na kamfanin Sony. Na kamfanin HTC sun sha banban da na kamfanin Tecno, da dai sauransu. Kowanne daga cikin wadannan kamfanoni idan ka kunna wayarsa mai dauke da manhajar Android, rubutun da za ka fara cin karo dashi kafin wayar ta gama kunnuwa, sun sha banban nesa ba kusa ba. Wannan shi ne abin da ya raba tsakaninsu.

Sauran kamfanonin waya suna gina wasu bangarori ne na musamman don kayatar da mai amfani da wayar. Wadannan bangarori su ake kira *Components* a gamammen harshen fannin kimiyyar sadarwa na zamani. Amma su kamfanonin waya suna da sunayen da suke ambaton wadannan kare-kare da suke wa asalin babbar manhajar. Wasu kan kira su *Overlays.* Wasu su kira su *Skins.* Wasu su kira su *Add-ons.* Wasu kamfanonin kuma suna kiransu *Mods.* Duk kalmomi ne dake ishara ga abu daya.

Kare-karen da kamfanonin waya ke yi ga asalin manhajar Android shi ne abin da ke banbanta nau’in Android da ke wayoyin kamfanin *Google,* a karon farko, sannan ya banbanta nau’in Android da wadannan kamfanoni suka cakuda, a tsakaninsu. Wasu kare-karen da kamfanonin ke yi kadan ne. Ba ya wuce su kara kananan masarrafai da mai mu’amala zai yi amfani dasu wajen sauraren sauti ko bidiyo ko taskance hotuna ko kayatar da na’urar daukan hoto da gina mata hanyoyin daukan hoto daban-daban da dai sauransu. Wasu kamfanonin kuma sukan jirkita manhajar ne gaba daya su mayar da ita wani abu daban, a ganin ido. Idan ba kwararre bane kai a fannin sadarwa, zai yi wahala ka iya gane cewa manhajar Android ce. Kamfanin da yayi fice a irin wannan aiki kuwa shi ne kamfanin *HTC,* musamman a wayarsa nau’in *HTC One.* Ya jirkita babbar manhajar ne gaba daya, zuwa wani abu; saboda tsabar kyale-kyale, da kare-kare, da canje-canje, da shafe-shafe.

Sai dai kuma, duk wasu kare-karen da kamfanonin waya ke yi wa babbar manhajar Android, suna yin hakan ne tare da kiyaye ka’idar kungiyar *Open Handset Alliance (OHA),* wanda ke dauke cikin kundinta mai suna: *Google Compatibility Test Suite (CTS).* Shi yasa, duk da canje-canjen da suke yi, za ka samu akwai masarrafan kamfanin Google idan ka shiga bangaren *Menu.*  Domin kamfanin Google ya haramta wa kamfanonin waya dora masarrafansa a kan wayoyinsu masu dauke da manhajar Android, muddin basu bi ka’idar dake cikin wannan kundi nasa ba. Shi yasa idan ka samu na’urar sarrafa bayanai na kamfanin *Amazon* mai suna *Amazon Kindle,* ba za ka samu manhajar Google ko daya a kai ba – duk da cewa babbar manhajar Android ce akanta - saboda kamfanin Amazon bai bi ka’idar *CTS* ba wajen canje-canjen da yayi. To amma tunda an ce babbar manhajar Android “kyauta ce,” ba za a hana shi amfani da ita ba.

**Bangarorin Babbar Manhajar Android**

Kowace babbar manhajar na’urar sadarwa tana da bangarori ne daban-daban. Idan masu karatu basu mance ba, a kasidarmu mai take: “Tsarin Babbar Manhajar Kwamfuta,” mun nuna cewa daga cikin bangarorin babbar manhajar kwamfuta, akwai bangaren dake lura da na’urar sarrafa bayanai dake cikin gangar-jikin kwamfutar, wato: “Processor,” sannan akwai bangaren dake karban umarni kai tsaye daga mai mu’amala da kwamfutar, wato: “User Interface” kenan. Sai dai a bangaren babbar manhajar Android abin ya dan sha bamban, saboda sarkakiyar dake cikin tsarin, da kuma mahallin da ake tsammanin kasancewarta a ciki bayan gina ta, wato wayar salula kenan.

Babbar manhajar Android, ko *Android Operating System,* kamar yadda muke dauke da ita a kan wayoyinmu na salula, tana dauke ne da bangarori har guda hudu. Wadannan bangarori duk da cewa suna dogaro ne da juna, amma tsarinsu ya sha banban.

Bangaren farko shi ne wanda ke can kasa; duk sauran bangarorin an gina su ne a samansa. Wannan bangare kuwa shi ne asalin madarar babbar manhajar Linux, wato *Linux Kernel* kenan. Babbar manhajar Linux daya ce daga cikin shahararrun manhajojin da kwamfutocin duniya a yau ke dauke dasu, kuma ana kididdige ta daga cikin mafi inganci. Wadanda suka gina babbar manhajar Android sun zabi wannan babbar manhaja ce saboda saukin mu’amala da take dauke dashi; kowace na’urar sadarwa na iya daukan wannan babbar manhaja. Na biyu, tana dauke da kariya (Security), ba irin babbar manhajar Windows ba. Domin galibin kamfanonin duniya masu ta’ammali da bayanai masu dimbin yawa, da ita suke amfani a kwamfutocinsu. Wannan bangare ne ke lura da dukkan mu’amalar da mai waya ke yi da babbar manhajar Android, da kokarin bashi kariya ko bayanan da yake mu’amala dasu.

Na uku, wannan babbar manhaja ta Linux tana da siffofi masu kayatarwa, musamman wajen manejin makamashi (Power Management), da agaza wa kwakwalwa da ma’adanar waya wajen manejin mahallin dake wayar (Memory Management), da ingancin siginar rediyo ko yanayin sadarwa da kuma ingantaccen tsarin samar da Intanet. Wannan bangare na Linux Kernel, bangaren farko kenan, wanda ke can kasa. Mai waya bazai taba ganin wannan bangare ba, idan ba kwararre bane shi a fannin sadarwa. Ko a haka ma, sai ya yi amfani da wasu manhajoji na musamman kafin ya iya aiwatar da sadarwa da wannan bangare na babbar manhajar. Amma ga wanda yake gama-gari, ba abin da ya shafe shi da wannan bangare. An gina wannan bangare ne da dabarar gina manhajar kwamfuta mai suna “C Programming Language.”

Bangaren babbar manhajar Android na biyu shi ne wanda ke saman bangaren “Linux Kernel,” wato: “Native Layer.” Wannan bangare mai suna “Native Layer” shi ne ke dauke da madaukan babbar manhajar. Abin da kalmar “Madaukai” ke nufi shi ne, bangarorin da babbar manhajar ta tanada don baiwa manhajojin da mai mu’amala da wayar ke amfani dasu damar taskance bayanansu. Misali, akwai tsarin da babbar manhajar Android ke amfani dashi wajen baiwa wayar damar taskance bayanai, kafin mai waya ya bukace su. Misali, idan ka tashi neman sunan abokinka dake wayarka, kakan shiga manhajar “Contacts” ne, ka zakulo sunan. Asali wadannan sunaye ba a cikin manhajar “Contacts” suke ba; suna cikin rumbun adana bayanan da babbar manhajar ta tanada ne (ba ma’adanar waya irin su “Memory Card” ko “Phone Memory” nake nufi ba). Wannan rumbun adana bayanai shi ake kira “Database.” Tsarin da ke samar da wannan runbun bayanai kuwa shi ne: “SQLite.” Kuma ire-irensa ne ke dauke a wannan mataki na biyu, wato: “Native Layer.” Ire-iren wadannan tsare-tsare da ke wannan bangare na biyu, gaba dayansu, su ake kira “Android Libraries,” kuma an gina su ne da dabarun gina manhajar kwamfuta masu suna: “C” da “C++” (C plus plus).

Sai bangare na uku, wanda ake kira: “Application Framework.” Wannan bangare shi ne ke dauke da tsarin dake tafiyar da manhajojin da muke mu’amala dasu. Misali, idan ka latsa tambarin manhajar “Message” don rubutawa da aika sakon tes, tsarin da ya zaburar da manhajar ta loda kanta daga ma’adanar waya inda take kwance, har ta bude don baka damar rubutu da aikawa, ana kiransa: “Activity Manager.” Wannan tsari mai suna “Activity Manager” aikinsa ne zaburarwa (Initialising), da kunnawa (Starting), da dakatarwa (Pausing), da kashewa (Stopping), da kuma batar da kowace irin manhaja ko masarrafa (Destroying) dake wayarka. Wannan tsari na aiwatar da aikinsa ne da zarar ka latsa manhaja ko alamar masarrafar da kake son budewa a shafin wayarka. Yana da dabi’u guda biyar zuwa shida (irin su “Activity” da “Intent” da sauran makamantansu) wadanda ta hanyarsu yake aiwatar da wannan aiki. Bayani na tafe kan tsarin “Activity Manager” da dabi’unsa, in Allah yaso. A takaice dai, wannan tsari da sauran makamantansa, su ne a dauke a bangaren babbar manhajar Android na uku, wato: “Android Application Framework.”

Bangare na karshe shi ne mahallin da manhajojin mai waya ke gudanuwa a kai. Wadannan su ne abubuwan da mai waya ke iya gani da zarar ya budo wayar; ya Allah a “Menu” ne, ko a “Settings” ne, ko a “Home Screen” ne ko kuma a “Notification Center” ne. A takaice dai, duk wani abin mai waya ke iya ganinsa da idonsa, har yayi mu’amala dashi a wayarsa, to yana dauke ne a wannan bangare na hudu, wanda shi ne a saman dukkan sauran bangarorin da bayanansu ya suka gabata. Wannan bangare shi ake kira “User Applications Layer,” kuma duk manhajojin da kake gani a nan, kashi 90 cikin 100, an gina su ne da dabarun gina manhajar kwamfuta mai suna “Java Programming Language.” Misalinsu su ne: “Contacts,” da “Message,” da dai sauransu. Wadannan ana kiransu “User Applications” kai tsaye.

Irin su lambobin waya kuma, da sakonnin tes da aka aiko maka, da hotunan dake jakar “Images” ko “ Pictures” dinka, da bidiyon dake dauke a manhajarka ta “Video” ko “Multimedia” suna dauke ne cikin wasu madaukai da ake kira “Android Components.” Mai karatu zai yi mamakin jin cewa lambobin wayarsa da sakonnin da aka aiko masa ba a cikin manhajar “Contacts” ko “Message” suke ba, alhali su yake budowa don ganin lambobin ko sakonnin. Lallai ba a ciki suke ba. Su wadannan manhajoji na “Contacts” da “Message” da kake latsawa don budowa, ba komai bane illa ‘yan aike. Cikakken bayani na nan tafe kan hakikaninsu.

**Tsarin Gina Manhajojin Android**

A baya mai karatu ya fahimci yadda aka gina babbar manhajar Android, daga kasa zuwa sama. Tare da bayani kan bangarorin da wannan babbar manhaja ta Android ta kunsa. A karshe, muka ce a bangare na kusa da na karshe ake da tsarin dake da lura da tafiyar da dukkan manhajojin da mai waya yake mu’amala dasu. Har muka kawo misalai da manhajojin sakonnin tes (Message Application), da kuma manhajar lambobin mai waya (Contact Application). A wannan mako in Allah yaso, mai karatu zai san yadda ake gina manhajoin da yake mu’amala dasu ne a wayarsa mai dauke da babbar manhajar Android, tare da tsarin gina su, da kuma rayuwarsu baki daya.

*“Sarkin Gida” (Activity Manager)*

Da farko dai, kafin bayani kan tsarin da Sarkin Gida (Activity Manager) ke bi wajen tafiyar da wayar gaba daya, zai dace mai karatu koyi wani sabon karatu daga wasu kalmomi na turanci da ya sansu, amma ma’anarsu ta sha bamban da yadda ya sansu. Wannan ne kadai zai taimaka masa wajen fahimtar tsarin da wannan Sarkin Gida yake bi wajen aiwatar da ayyukansu. A nan ne kuma, idan mai karatu ya natsu sosai, zai gane dalilin da ya sa na kira wannan tsari da suna: “Sarkin Gida.” Ga kalmomin nan:

*Applications*

Kalmar “Application” kamar yadda watakila mai karatu ya sani, na ishara ne ga manhaja ko masarrafar da mai waya ke amfani ko mu’amala dasu. Wadannan manhajoji dai sun hada da wadanda wayar take zuwa dasu (irin su manhajar “Message” da manhajar “Contact” da manhajar “Video” da dai sauransu), da kuma wadanda mai karatu ke iya saukarwa kyauta ko ta hanyar saya, daga Cibiyar Manhajoji na kamfanin Google da wayar ke zuwa dasu, wato: “Google Play” ko “Play Store.”

Wadannan manhajoji duniyoyi ne masu zaman kansu, saboda irin sarkakiyar dake ciki wajen gina su. Wadanda ke gina su sune masana kan manhaja da masarrafar kwamfuta, wato “Developers” ko “Computer Programmers.” Duk da dayan sunan na ishara ne ga “gina manhajar kwamfuta,” sai dai suna ne kawai; su ne dai masu gina manhajar wayoyin salula har wa yau. Bayani kan tsari da kintsi da hakilon da suke shiga ko yi wajen gina wadannan manhajoji ko masarrafai kuma, wannan wani karatu ne mai zaman kanshi da nan gaba mai karatu zai ci karo dashi.

*Activity*

Kalmar “Activity” na nufin aiki ne, a hakinakin ma’anarta a luggar turanci. Amma a ilimin gina manhajar Android (Android Programming), kalmar na ishara ne ga dukkan wani nau’in mu’amala da za ka iya yi da manhajar wayar salula. Misali, daga lokacin da ka budo manhajar aika sakon tes, shafin da ya budo mai dauke da jerin sakonninka, “Activity” ne, idan ka sake latsa wani bangare a cikin manhajar (kamar tsarin rubuta sakonnin tes, wato Compose, misali), sai a dakatar da asalin shafin da kake a baya, a budo maka wanda ka bukata. Idan k agama rubuta sakonka, sai ka latsa alamar “Send,” nan ma sai a sake dakatar da wancan shafi da kake ciki (duk da kai za ga shafin ya bace) a tsallaka da kai zuwa shafin da jerin sakonninka suke. Wannan shafi da aka dawo da kai (idan daga gare shi ka fita a baya), an farkar dashi ne don ci gaba da aikinsa. Da zarar ka rufe manhajar baki dayanta, sai “Sarkin Gida” ya kashe rayuwar manhajar baki daya. Kada mai karatu ya rikice da wadannan kalmomi; nan gaba zai fahimce su sosai, cikin sauki.

Wannan tsari na “Activity” yana da marhaloli har guda biyar. Bayani kan wadannan marhaloli na nan tafe nan ba da jimawa ba. Zagayen marhalolin da tsarin “Activity” ke bi, daga farko zuwa karshe, shi ake kira “Activity Lifecycle.” Marhalar farko ita ce marhalar “Rayuwa.” Marhala ta biyu ita ce marhalar “Gudanuwa.” Marhala ta uku ita ce marhalar “Dakatarwa.” Marhala ta uku ita ce marhalar “Farkarwa.” Marhala ta hudu ita ce marhalar “Tsayarwa.” Sai marhala ta karshe, wato marhalar “Kashewa.”

Wadannan tsare-tsare da marhaloli da tsarin “Activity” ke bi sun samo asali ne tun daga wajen gina manhajar. Maginin manhajar ne ya tsara su haka, domin ka’ida ce dake cikin tsarin gina manhaja ko masarrafai da ake iya mu’amala dasu a kan babbar manhajar Android. Don haka dole ne maginin masarrafar ya shigar da wannan tsari da kowace manhaja ke bi a rayuwarta, a yayin da yazo gina manhajar da yake kan ginawa.

*Intent*

A harshen Turanci idan aka ce “Intent” ana nufin manufa ce, ko nufi, ko wani abu da mutum ke dashi a ransa yake son aikatawa ko aiwatarwa. Amma idan ka kutsa cikin fannin gina manhajar wayoyin salula na babbar manhajar Android, ma’anar kalmar ta canza, nesa ba kusa ba. Kalmar *Intent* na nufin wani yunkuri da wani bangaren masarrafa ko manhaja tayi, don neman aiwatar da wani aiki da mai wayar ya bata. Misali, idan aka turo maka sakon Imel ko tes mai dauke da adireshin gidan yanar sadarwa da ake son ka shiga, da zarar ka matsa ko latsa adireshin, nan take wayarka za ta tambayeka: “Da wacce manhajar shiga Intanet kake son aiwatar da wannan aiki?,” tare da kawo maka hotunan nau’ukan masarrafar shiga Intanet dake cikin wayar, ka zabi wanda kake so. A gefen dama za ka ga “Use Once” a dayan bangaren kuma za ga “Always.” Idan ka latsa “Use Once,” to, a duk sadda ka nemi aiwatar da aiki irin wannan sai an sake gabatar maka da wannan hoto. Amma idan ka latsa “Always” ne, to, manhajar da ka zaba ita ce za a rika bata dama wajen shigar da kai Intanet idan bukata irin ta sake tasowa.

Tsarin da ya zaburar da wannan hoto da ake tambayarka a kai, shi ake kira “Intent.” Kuma dole ne, zan maimaita, dole ne ga mai gina manhajar Android ya shigar da wannan tsari a manhajar da yake ginawa don amfani da ita a kan babbar manhajar Android.

*Service*

Wannan tsari mai suna “Service” a harshen Turanci wani irin tsari ne dake gudanuwa a karkashin kasa. Ba ya mu’amala da kai kai-tsaye. Misali, idan ka budo manhajar sauraron sauti (“Music” ko “Sound,” misali), nan take wannan tsari ya fara gudanuwa a karshin kasa, kai ba za ka sani ba. Idan kaje “Application Monitor” (idan har kana da wannan tsari a wayarka), za ka ga sunayen manhajojin da suke gudanuwa a wayarka; da wadanda suke bude kana ganinsu da wadanda ba ka iya ganinsu a zahiri. Wannan suna da kake gani, ba hakikanin manhajojin bane, a a, tsarin “Service” ne dake gudanar dasu. Rayuwar wannan tsari ba ta da tsawo. Da zarar ka kulle wata manhaja da ka budo, nan take su ma sai su “mutu.”

*Content Providers*

“Content Providers” tagwayen suna ne dake nufin “Tsarin musayar bayanai a tsakanin manhajojin wayar salula mai dauke da babbar manhajar Android.” A ka’ida, duk manhajar da ka budo, tana budowa ne tare da bayanan da take dauke dasu. Misali, idan ka budo manhajar “Contacts” wacce ke bayyana maka lambobin abokanka da ka adana a waya, nan take za ka ga sunayensu tare da lambobin; iya gwargwadon yadda ka tsara manhajar. Duk da cewa manhaja daya ce ka budo, amma manhajoji biyu ne suka budo. Ta farko ita ce manhajar da ka latsa alamarta a shafin wayarka, wato alamar “Contacts” kenan. Manhajar ta budo, wacce idonka ba ya iya gani, ita ce manhajar “Contact Content Provider.”

Wannan manhaja ta biyu, wacce ba ka iya gani a zahiri, ita c eke dauke da dukkan lambobin, wato hakikanin lambobin nake nufi. Ita manhajar farko da ka latsa kuma, hanya ce, wacce ke dauke da wasu hanyoyi (kamar tsarin shigar da lamba – Add Contact – da tsarin goge lamba – Delete Contact – da tsarin sanya hoton mai lambar waya – Contact Image/Pic, da dai sauransu). Amma hakikanin lambobin fa? Suna can cikin wancan manhaja da ba ka iya gani a zahiri.

Haka lamarin yake idan ka budo manhajar “Message,” asalin sakonnin suna dauke ne a cikin “Message Content Provider.” Idan ka budo manhajar “Multimedia” ma, asalin bayananka na sauti da bidiyo da hotuna da kake cin karo dasu a cikin wannan manhaja, duk suna dauke ne a cikin manhajar “Multimedia Content Provider.” Idan kaje bangaren “Settings” – wato Tsare-tsare – ma haka lamarin yake. Duk abin da kake cin karo dasu daga sama zuwa kasa na bayanai, wadanda kake tsara yadda za ka yi mu’amala da wayar dasu, duk asalinsu a cikin “Settings Content Provider” suke.

Daga bayanan da suka gabata mai karatu zai fahimci cewa, lallai “Content Providers” wani tsari ne dake taskance bayanan mai waya, wadanda ya zuba da kanshi. A takaice dai, tsarin “Content Providers” rumbun adana bayanai ne. Kowace wayar salula na da wannan tsari, amma na Android ya sha bamban, saboda kwarewar maginansa. Asalin dabarun gina rumbun adana bayanai (Database Programming) da babbar manhajar Android ke amfani dashi wajen yin wannan aiki kuwa shi ake kira “SQLite.” Dabarar gina rumbun adana bayanai na “SQLite” ya shahara matuka, kuma tsari ne mai matukar inganci wajen samar da rumbun adana bayanai a wayoyin salula mai kyau.

*Broadcast Receivers*

Sai kalmar “Broadcast Receivers,” wacce ke aiki da wani tsari na musamman mai suna “Push-Subscribe Mechanism.” “Broadcast Receivers” tsari ne da aka gina kan babbar manhajar Android, wanda ke lura da aukuwar al’amura a waya, da kuma sanar da aukuwarsu, don baiwa wadanda ke da alhakin yin wani abu kan wannan lamari, damar yin abin da ya kamata.” Wasu bayanai ne aka ajiye, suna kwance a cikin wayar, sai wani lamari ya faru suke farkawa, don sanar da aukuwar abin. Ba tsari bane mai wahala. Amma idan babu misali, zai yi wahala mai karatu ya fahimci tsarin.

Babban misali na kan manhajar sakonnin tes. Idan aka turo maka sakon tes ya shigo cikin wayarka, a ka’ida ta asali, ya kamata kawai ka ga tes din ne, babu abin da zai fadakar da kai cewa wani sako ya shigo. Amma ba haka lamarin yake ba a yanzu. Idan tes ya shigo, ko dai kaji sautin shigowarsa ne, wanda ke fadakar da kai hakan, ko kuma kaji diri (wato “Vibrating”); ya danganci yadda ka tsara wayar. Wannan diri ko sauti da ya fadakar da kai, duk ana kiransu “Broadcast Receivers,” wato “Masu karban sakon fadakarwa don su fadakar da mai waya.”

Haka idan wani ya kira layinka, a halin yanzu wayarka za ta fadakar da kai ne ta hanyar sauti (Ringing) ko ta hanyar diri (Vibrating) ko ta dukkan hanyoyin biyu (Vibrate then ring) ko kuma ta hanyar ganin sunan wanda ke kiranka a fuskar wayar, kai tsaye. Wannan zai faru ne idan ka hana ta kara ko diri. Ma’ana ka sanya ta a yanayin “Shiru” (Silence) kenan. Wadannan hanyoyin fadakarwa na sauti da diri, duk ana kiransu “Broadcast Receivers” ne. Wannan karin misali ne kan misalin farko.

A daya bangaren kuma, idan makamashin batirinka yayi kasa (Low Battery), a ka’ida za ka iya gane hakan ne kawai ta hanyar ganin tambarin batir dake fuskar wayarka yana raguwa daga sama zuwa kasa. Amma a halin yanzu a zahiri lamarin bai tsaya a haka kadai ba. Idan batir yayi kasa a yanzu nan take za ka ji wayar tana tsowa idan waya kake yi, alamar fadakarwa ce cewa: “Ka lura, batirinka ya kusa karewa.” Haka idan batirin ya kusan zuwa karshe, ma’ana karancin ya kai makuran karanci, nan take wayar za ta shawarceka da ko dai ka sa ta a caji, ko kuma ka mayar da ita yanayin da za ta iya rayuwa cikin karancin makamashin da ta samu kanta. Idan kaki, nan take da kanta za ta rage kaifin hasken dake shafinta, sannan ta kashe wasu manhajojin dake karkashin kasa wadanda ke cin makamashi, idan tafiya tayi nisa kuma baka sa ta a caji ba, nan take sai ta dauke; hasken ya dusashe. Wadannan abubuwa da wayarka tayi, tsarin “Broadcast Receiver” ne suka sarrafata don aiwatar dasu. Kana so ko ba ka so, dole sai haka ta faru.

Wannan tsari na “Broadcast Receiver” yana da ginshikai guda biyu dake tafiyar dashi. Ginshiki na farko shi ne bangaren dake samar da tsarin fadakarwar. Wannan bangare shi ake kira “Broadcasters.” Shi ne tsarin da maginin manhajar ya tsofa a cikin wayar sadda yake gina manhajar. Cewa, “A duk sadda sakon tes ya shigo, ki sanar da mai wayar ta hanyar sautin da mai wayar ya zaba don a fadakar dashi shigowar sakon tes.” Wannan tsari yana gine ne a cikin manhajar wayar. Mai wayar ba ya iya ganin tsarin, domin ba abu bane dake zahiri. Sai bangare na biyu ko ginshiki na biyu, wanda ke karbar sakon fadakarwa don ya fadakar. Wannan bangare shi ake kira “Receivers.” Su ne manhajojin dake aikin fadakarwar. Su ma an shigar musu da tsarin ne, cewa “Duk sadda kuka samu sako daga bangaren ‘Broadcasters’ to, ku yi abu kaza.”

*Application Context*

Wannan shi ne tsarin dake lura da mahallin masarrafai ko manhajar dake wayar salula; daga budewa zuwa rufewa. Duk bayanan da suka gabata daga makon jiya zuwa bangaren farko na kasidar wannan mako, masu dauke da tsare-tsare irin su “Activity,” da “Intent,” da “Services,” da “Content Providers,” da kuma “Broadcast Receivers,” duk suna gudanuwa ne a cikin wani tsari mai kama da mazubi da ake kira “Application Context.” A karkashin wannan tsari, mai waya ba ya iya komai; tsarin ne ke tafiyar da kansa.

Wadannan, su ne mahimman bangarorin da suka kamata mai karatu ya fahimce su kafin mu shiga bayani kan Sarkin Gida, wato tsarin “Activity Manager” kenan. Kamar yadda muka sani ne, bangarorin babbar manhajar wayar salula suna kamaiya ne a tsakaninsu; wannan ya kama ya ba wannan; daga farkon tsari har karshe. Kamar dai yadda bangarorin jikin dan adam ke gudanuwa. A yanzu ga bayani kan tsarin “Activity Manager.”

*Activity Manager*

Kamar yadda bayani ya gabata a baya, tsarin “Activity Manager” ne ke gudanar da dukkan abin da ke faruwa a wayar salula mai dauke da babbar manhajar Android. Tsari ne mai kyau, mai cike da tsari, don inganta yanayin gudanuwar ayyukan kowace manhaja dake wayar. Idan kana son sanin wani tsari kwatankwacin wannan, don karin fahimta, to ka dubi tsarin “Task Manager” dake tafiyar da manhajojin dake gudanuwa a babbar manhajar Windows na kamfanin Microsoft.

Asalin fahimtar da ta samar da tsarin “Activity Manager” na da alaka ce mai karfi da wacce ta samar da tsarin “Task Manager” na kwamfuta. Sai dai akwai bambanci tsakanin tsarinsu. A yayin da a manhajar Windows mai kwamfuta na iya sarrafawa da canza tsare-tsaren “Task Manager,” a fannin gina manhajar Android, mai wayar salula ba shi da kudira wajen iya gani ma, balle canza tsare-tsaren “Activity Manager.” Idan mai karatu bai manta ba, a bangaren da nayi bayani kan “Manufar Gina Manhajar Android,” na nuna cewa daga manufofin akwai kokarin samar da sauki ga mai waya. Wannan manufa ce take kokarin rage wa mai waya yawan katsalandan da zai iya yi kan babbar manhajar. Sai aka kulle abubuwa da dama, wadanda bazai iya kaiwa gare su ba, balle ya iya sarrafa su ko canza su. Ba don komai ba sai don ganin cewa wadannan tsare-tsare da aka hana shi kaiwa gare su, suna taimakawa wajen rage masa aiki ne, da kokarin samar masa da sauki wajen mu’amala da manhajojin da yake amfani dasu.

Kari a kan haka, tsarin “Activity Manager” ya fi inganci wajen tafiyar da manhaja, domin ya dauke wa mai waya alhakin ayyukan ne gaba daya. Wannan ke nuna wayar ba za ta samu matsala ba, domin tsarin da yake gundanar da ita, shi ne ke lura da ita har wa yau. Masana a fannin Android sun ba da misali da mota mai dauke da tsarin giya dake sarrafa kansa, wato “Automatic Transmission System.” Injinta ya fi karko idan ka hada ta da injin wacce mai motar ne ke sanya giya da kansa, wato “Manual Gear System”; a duk lokacin da ya ga dama.

*Yadda Activity Manager ke Tafiyar da Aikinsa*

Wannan tsari na “Activity Manager” na tafiyar da ayyukansa ne cikin marhaloli guda biyar, kamar yadda bayani ya gabata a makon jiya. Wadannan marhaloli su ake kira “Activity Lifecycle.” Duk da cewa bayani ya gabata cewa tsarin “Activity” ne ke da wadannan marhaloli, sai dai sauran tsare-tsaren ma, duk suna cikin wannan tsari ne. A matsayinka na mai waya, da zarar ka kira wata manhaja, ko masarrafa misali, tsarin “Activity Manager” zai gudanar maka da ita nan take, daga samarwa zuwa kashewa. Ga marhalolin da kowane tsarin “Activity Manager” ke bi wajen tafiyar da manhajojin wayar Android nan:

*onCreate(), onStart()*

Da zarar ka latsa wata manhaja da nufin budewa a wayarka, nan take Sarkin Gida (Activity Manager) zai “rayar” maka da ita, ta hanyar loda manhajar, tare da bayanan da take aiki dasu. Wannan marhalar farko kenan, kuma ita ce marhalar da ake kira “Starting State,” wato “Marhalar Rayuwa.” A wannan marhalar, zai yiwu kana matsa alamar manhajar nan take manhajar ta bude, ko kuma a dan samu jinkiri na dakika biyu ko uku kafin manhajar ta bude. Latsa manhajar da kayi, ka baiwa tsarin “Activity Manager” umarni ne ya rayar maka da manhajar. A yayin da ka latsa, nan take zai baiwa wayarka umarnin budo manhajar, ta hanyar tsarin gina manhajar kwamfuta guda biyu (Methods) da ake kira: “onCreate()” da “onStart()”. Wannan ita ce marhalar farko. Kuma ita ce marhalar da tafi cin makamashin waya, saboda hidimar da wayar salula keyi wajen samar wa wannan manhaja da ka latsa wurin zama, ta hanyar Sarkin Gida.

*Marhala ta Biyu*

Da zarar manhajar da ka latsa ta budo, to, an zo marhala ta biyu kenan. Wannan ita ce marhalar da ake kira “Running State,” wato “Marhalar Gudanuwa.” Misali, idan ka latsa manhajar sakonnin tes (Message App), shafin zai budo. Wannan shafi da ya budo kuma yake fuskantarka, ya kai mai mu’amala da waya, yana cikin yanayin mu’amala kenan, wato “In Focus,” a marhalar Gudanuwa. A tsarin mu’amala da babbar manhajar Android, yanayi daya kadai mai mu’amala da waya ke iya mu’amala dashi a lokaci guda. Wannan ba ya hana a samu wasu manhajojin dake bude a lokacin. Da zarar ka latsa bangaren rubuta sakonnin tes a shafin wannan manhaja, wato “Compose,” nan take Sarkin Gida zai jefa uwar manhajar da ka budo zuwa marhala ta gaba.

*onPaused()*

Wannan ita ce marhalar “Dakatarwa,” wato “Paused State.” Kada mai karatu ya mance, har yanzu manhajar sakonnin tes da ya budo tana nan, amma bangaren da yake mu’amala da shi ne kadai (wato Compose) yake “Marhalar Gudanuwa.” Daya bangaren kuma, wato gangar jiki manhajar tes din, duk da cewa shi ma a bude yake, sai dai ya fita daga marhalar gudanuwa zuwa marhalar dakatarwa; don ba da shi ake mu’amala ba yanzu. Idan ka gama rubuta sakonnin tes, sai ka dawo baya ka ci gaba da duba sakonnin da wasu suka aiko maka, to, sai a mayar da kai marhala ta baya, wato “Marhalar Gudanuwa,” ko “Running State.” Amma idan ka rufe manhajar gaba dayanta daga shafin da kake, sai Sarkin Gida ya zarce da kai marhala ta gaba.

*onStop()*

A halin yanzu ka rufe manhajar da ka budo a baya, nan take sai Sarkin Gida ya kira tsarin *onStop()* (wato *onStop() Method Call*), don tsayar da gudanuwar manhajar da ka budo a baya. Wannan ita ce marhalar “Tsayarwa.” Har yanzu manhajar bata fice daga jikin wayarka ba, duk da cewa ka daina ganinta a shafin wayar. A gare ka kam ta bace, amma a hakika, tana shige cikin marhala ta hudu ne, wato “Stop State.” Da zarar an samu wani lokaci mai dan tsawo baka sake kiran wannan manhaja da ka rufe dazu ba, sai Sarkin Gida ya wuce da ita marhala ta karshe.

*onDestroy()*

Marhala ta karshe ita ce marhalar “Kashewa”, wato “Destroy State.” A wannan marhala, Sarkin Gida ya kashe manhajar ce gaba dayanta daga gudanuwa, don samar wa wasu manhajojin da za ka iya budowa nan gaba mahallin gudanuwa. Wannan ita ce marhala ta karshe. Lokacin da Sarkin Gida zai kira tsarin *onDestroy() (*wato *onDestroy() Method Call)* don share dukkan bayanan da suka danganci wancan manhaja da ka rufe dazu, daga cikin kwakwalwa ko ma’adanar wayar.

**Matashiya**

**A makon da ya gabata** mai karatu ya fahimci yadda babbar manhajar Android, ta amfani da tsarin “Activity Manager,” ke taimaka wa mai waya wajen mu’amala da masarrafa ko manhajar da yake budewa don amfani dasu. Duk da cewa na samu sakonni da dama daga masu karatu kan wasu daga cikin dabi’un Android da jama’a ke korafi kansu, zan dakatar da bayani kan dalilan da suka sa haka ke faruwa. A yau cikin dacewar Ubangiji za mu ga yadda ake gina manhajojin da ake amfai dasu a babbar manhajar Android ne. kada mai karatu ya rikice.

A baya na yi bayani ne kan manufar gina babbar manhajar Android. Wannan a fili yake. Ma’ana na yi Magana ne kan manufofin da kungiyar Open Handset Alliance ya kiyaye wajen gina manhajar. A karo na biyu kuma nayi bayani kan tsarin gina manhajojin da mai waya ke amfani dasu a kan Android, wanda ya kunshi bayani kan tsare-tsaren dake cikin manhajojin, da dabi’unsu. Wannan bayanin ne ma ya kawo mu kan tsarin “Activity Manager” da sauransu. Bayanin yau, wanda nake sa ran ya zama na kusa da karshe, kan yadda ake gina manhajojin da ake amfani dasu ne a kan Android, da matakan da ake bi kafin yin hakan, da kayayyakin aiki da ake bukata kafin fara hakan, sannan da aiwatar da ginin, a aikace. Ban ce wadannan bayanai za su takaitu cikin kasida guda ba. Amma dai, bari mu gwada mu gani.

**Gina Manhajojin Android a Aikace**

Dukkan manhajojin da mai amfani da wayar Android ke saukarwa daga Cibiyar Play Store ko Google Play, mutane ne suka tsara su, suka gina su, sannan suke watso su wajen, kyauta. Ta yiwu mai karatu ya kalli abin yaga kamar da wuya ya iya. Wannan abu ne mai sauki, wai cire wando ta ka. Kana iya gina manhajar Android kai ma ka loda a wannan cibiya, da harshen Hausa. Ba wani abu bane mai wahala. Idan ma da wahala, to duk bai wuce rashin sanin matakai da hanyoyin gudanarwa ba.

*Masu Ginawa*

Masu gina wadannan manhajoji dai sun kasu kashi kashi ne, dangane da kwarewa na ilimi nake nufi. Akwai wadanda su daman can aikinsu kenan gina manhajojin kwamfuta, tun kafin zuwan Android. Da wannan babbar manhaja ta samu, sai suka kalli tsari da kintsinta, suka kalli dabarun gina manhajar kwamfuta da aka yi amfani dasu wajen gina ta, daga nan suka kama gina manhajojin da za su iya gudanuwa a kanta. Kashi na biyu su ne wadanda suka koyi abin daga matakin farko zuwa kurya, a ilimance, a aikace. Dukkan wadannan biyun ana kiransu “Android Developers.”

*Hanyoyin Ginawa*

Dangane da gina manhajojin Android a aikace, akwai hanyoyi guda biyu, ko uku. Haryar farko ita ce ta amfani da gundarin ilimin gina manhajojin kwamfuta, wato “Application Programming Language,” don gina masarrafan. Wannan ita ce hanyar da kwararrun masana a wannan fanni suke bi wajen gina manhajar Android. Bayani kan nau’ukan ilimomi ko dabarun yin hakan kuwa na nan tafe in Allah ya so. Hanya ta biyu kuma ita ce ta yin amfani da manhaja ta musamman, don gina manhajar Android. Wannan ita ce hanyar da galibi wadanda ke da sha’awar gina manhajar Android ke amfani da ita a farko; ko don sha’awan yin hakan kadai, ko kuma don “farawa” da “gawadawa.” Wannan hanya ta biyu babu wata kwarewa ta musamman tare da ita, domin cikin ‘yan mintina kana iya gina manhajar Android ba tare da gumi ba. Sannan manhajar da za ta taimaka maka wajen yin hakan ma kyauta za ka same ta a Intanet.

Galibin manhajojin Android na littafai (kamar Kur’anai da Hadisai ko littafan ilimi, ko album na hotuna da muke gani a cibiyar Play Store) duk da ire-iren wadannan manhajoji ake gina su.

Hanya ta uku ita ce yin amfani da hanyoyi biyun farko da suka gabata, don tsarawa, da ginawa da kuma kayatar da manhajar Android. Ba dukkan kwararru ke amfani da wannan hanya ba. Galibi wadanda ke amfani da hanya ta biyu ne ke neman kwarewa wajen hada dabarun guda biyu. Akwai hanya ta karshe, wacce ta shafi karance-karance kan yadda ake gina manhajar Android a aikace, ta hanyar littattafan da aka rubuta, da hotunan bidiyo da masana a wannan fanni suka tsara kuma ake samu kyauta a Intanet. Wannan hanya tana da inganci matuka, domin hanya ce mafi sauki da za ta kai dalibi zuwa hanyar farko, wato hanyar da masana ke amfani da ita. Ta fi hanya ta biyu inganci, domin duk abin da ka karanta kuma ka aikata, ya zauna a kwakwalwarka kenan.

Duk da haka, abin da yafi mahimmanci dai shi ne manhajar ta zama mai inganci. Ba kuma abin da ke taimakawa wajen yin hakan illa kwarewa da hazakar mai gina manhajar.

*Ilimin Ginawa*

Gina manhajar da za ta iya wanzuwa da gudanuwa a kan babbar manhajar Android yana bukatar ilimi matuka, da lokaci, da kuma sadaukar da kai. Duk da nace ba abu bane mai wahala. Akwai nau’ukan ilimi da dabarun gina manhaja da ake amfani dasu wajen yin wannan aiki masu dimbin yawa. Amma wanda yafi shahara shi ne dabarun gina manhajar kwamfuta mai suna *JAVA.* Bayan shi akwai wasu kanana irin su *Python.* Amma dai *JAVA* ya fi shahara. Saboda saukin mu’amala da yake dauke dashi, sannan tsari ne mai iya wanzuwa a kowace irin kwamfuta ko madauki na sadarwa mai amfani da manhaja – Windows ko Linux ko Mac.

Idan kana son koyon yadda ake gina manhajar Android ta amfani da wannan ilimi na JAVA kuwa, dole ne ya zama kana da sanayya kan wannan ilimi iya gwargwado; ko da kuwa a matakin farko ne. Sai kuma dabarar hade bayanai waje daya mai suna *Extensible Markup Language,* ko *XML* a gajarce. Nau’in ilimi ne mai matukar mahimmanci a tsari da fannin sadarwa na zamani. Idan ka budo manhajar da ke gudanuwa a kan Android, za ka samu tana dauke ne da siffa na zahiri da ta kunshi shafin farko, da shafi na biyu har zuwa yadda aka tsara, sannan da hanyoyin mu’mala da manhajar na zahiri, wato *Menus* da *Toolbars* da *Windows* misali. Duk wadannan siffofi na zahiri ana tsara su ne da wannan ilimi na hade bayanai mai suna *Extensible Markup Language.* Kwatankwacin wannan ilimi kamar kwarangwal ne da kafinta ke yi wanda ake kira rafta, kafin ya fara dora fallen kwano a saman gini. Ko kwarangwal din kofofi da tagogin sabon gida, kafin a zo a dora hakikanin marafan kofofi da tagogin. Wannan ilimi yana da matukar mahimmanci da tasiri sosai a wannan fage.

Idan ka bude hakikanin jakar bayanan dake dauke da wata manhaja ta Android, za ka tarar tana dauke ne da manyan bangarori guda biyu; bangaren siffofinta na asali wanda aka tsara da ilimin XML, sai kuma bangaren da ke lura da tsara bayanai da kyale-kyalen da manhajar ke dauke dasu, wanda aka tsara da dabarun gina manhaja (ko dai ya zama JAVA ko wani ilimi daban).

Idan kai kwararre ne a wannan fanni, ba sai na gaya maka hanyoyin da za ka bi ba. Amma idan irina ne kai, to, kana da hanyoyi biyu. Ko dai kaje makaranta a koya maka (akwai makarantun karantar da yadda ake gina manhajojin wayar salula a Najeriya), ka biya abin sadaka, ko kuma ka zauna ka bata hankalin dare, don koya wa kanka ta hanyar karanta littattafan da aka rubuta a wannan fanni, ko hotunan bidiyo, don ganin yadda ake abin a aikace.

Idan ka zabi zuwa makaranta, a nan sai dai kaji da kudin makaranta, wanda galibi daga naira dubu hamsin (N50,000) ne zuwa sama. Za a koya maka cikin kasa da watanni uku, idan kana bukata. Wannan karantarwa da za a maka ya hada da kwatanta ilimin ne a aikace. Amma wannan ba zai sa ka kware ba nan take, sai ka yi ta maimaita abin a aikace. Kada ka mance, da babu makoyi, da gwanaye sun kare.

Idan kuma ka zabi zama da kanka ne don koyo, wannan ma abin maraba ne. Sai dai dole ne ka tarbiyyantar da kanka. Koyon ilimi ba tare da malami ba, aiki ne ja, in ji mutan garin Dan Ja a katsina. To, akwai littattafai da dama. Wadannan littattafai an rubuta su ne a lokuta daban-daban, ta amfani da mazubin tubulin gina manhajar Android daban-daban. Ga kadan daga cikinsu nan (idan mai karatu na bukata yana iya tuntubata sai mu shirya yadda zan turo masa):

Littafin farko mai take: “Android Application Development Cookbook: 93 Recipes for Building Winning Apps,” wanda Wei-Meng Lee ya rubuta, yana dauke ne da hanyoyi da dabarun gina nau’uka ko bangarorin manhajar Android guda 93! Littafi ne mai kayatarwa ainun, kuma ya yi amfani ne da zubin JAVA na 6, “Java Version 6.” Sai littafin shahararren marubuci Jason Ostranda mai suna: “Android User Interface Fundamentals,” mai shafuka 337. Littafin na koya wa mai karatu ne yadda zai gina fuska da shafuka da hanyoyin mu’amala a manhajar Android, wato “idon gari.” Wannan wani bangare ne mai mahimmanci a ilimin gina manhajar Android, domin shi ne bangaren da mai waya ke mu’amala dashi. Sai littafi na gaba mai take: “User Interface Design for Android Apps,” wanda Ryan Cohen da Tao Wang suka rubuta. Littafi ne na hadin gwiwa, kuma, kamar wanda ya gabace shi, yana karantar da yadda ake tsara hanyoyin mu’amala da manhajar ne. Shafukan littafin basu shige 173 ba; babu yawa. Sannan akwai hotuna da gamsassun bayanai masu nuna wa mai karatu yadda zai dabbaka abin da ake koya masa.

A bangaren masu koyo na fari kuwa, akwai littafin shahararren masani Masumi Nakamura da abokinsa Marko Gargenta, mai take: “Learning Android.” Littafi ne dake koyar da yadda ake gina manhajar Android daga farko zuwa karshe, ta hanya mai sauki, da hotuna da bayanai. A cikin littafin, marubutan sun kwatanta yadda mai karatu zai iya gina manhajar Dandalin Abota mai amfani da tsari irin na “Twitter,” wajen musayar ra’ayi tsakaninsa da abokansa. Idan kabi wannan littafi, za ka iya gina taka manhajar, har ma kayi gogayya da abokanka a yanar gizo. Shafukan littafin ba yawa; dari biyu da ashirin da takwas (228) ne kacal! Sai littafi mai take: “Java Programming for Android Developers for Dummies.” Wannan littafi ne da aka rubuta shi musamman don karantar da wadanda suka kware a fannin gina manhajar kwamfuta ta amfani da tsarin JAVA, don su iya gina manhajar Android cikin sauki. Littafin na dauke da darasi na musamman kan ilimin JAVA a gajarce, sai kuma darasi mai zurfi kan yadda ake gina manhajar Android. Wannan littafi yazo ne don kashe tsuntsaye biyu da dutse daya. Marubuci Barry Burd ne ya rubuta littafin, kuma shafukansa gaba daya 458 ne.

A nashi bangare, Wallace Jackson ya rubuta littafin: “Pro Android Graphics,” don karantar da yadda ake tsara hotuna, da bidiyo, da kuma sauti a manhajar Android. Babbar magana. A cikin littafin, wanda shafukansa basu shige 605 ba, ya nuna a aikace yadda ake tsara wadannan abubuwa cikin sauki (ga wanda ya sadaukar da kansa). Littafi ne mai dadin karatu ga wanda yake sha’awa kuma yake iya jure tsawon lokacin karatu. Yana fitar da wannan littafi kuma sai ga wani mai taken: “Pro Android Flash,” wanda marubuta Stepehn Chin, da Dean Iverson, da Oswarld Campesato da kuma Paul Tirani suka rubuta. Littafin na karantar da yadda ake shigar da tsarin *Flash* ne, wanda wani tubali ne na musamman wajen mu’amala da bidiyo a wayoyin salula. Shafukan littafin 463 ne.

Wadannan kadan ne cikin kadan na littattafan da ake kan rubutawa don karantar da yadda ake gina manhaja da masarrafar da za a iya amfani da ita kan babbar manhajar Android, cikin sauki da kayatarwa. Abin da ya rage wa mai karatu kawai shi ne ya sa sha’awar abin cikin zuciyarsa, sannan ya sadaukar da lokacinsa don cin ma burinsa. Allah sa mu dace, amin.

*Dabaru da Kayan Aikin Ginawa*

Bayan littattafai da kwarewa da kuma manhajoji, mai karatu na bukatar abubuwa guda uku mahimmai kafin ya gwanance wajen tsarawa da gina ingantattun manhajojin Android. Idan bamu mance darasin makon jiya ba, mun yi bayani ne kan matakan ilimi ko kwarewa da a halin yanzu ake bi wajen gina wadannan manhajoji. Tare da nuna cewa matakin karatu da kwatanta abin da aka karanta a aikace, su ne manyan tubali wajen gwanancewa a wannan sana’a. A wannan mako za mu karkare wannan doguwar kasida ce da bibiyar hanyoyi uku na karshe, don cinma burin mai buri a wannan fage.

*Sadaukar da Lokaci*

Dayan biyu ne; ko dai ya zama ka dauki wannan fage ne don sha’awa kawai (hobby), don ka rika gina manhajoji kana amfani dasu ko raba wa mutane suna amfani dasu, ko kuma ya zama kana son daukan wannan fage ne a masayin sana’a. Zai iya yiwuwa kuma kana son farawa da matakin farko ne, daga baya, iya gwargwadon yadda ka ga ka kware, ka nausa zuwa mataki na biyu. Ko ma dai mene ne, dole sai ka sadaukar da kanka wajen wannan aiki. Domin fannin gina manhajar kwamfuta (Programming) ba fannin ‘yan kailula bane; ayi yau, ba za a sake dawowa ba sai bayan wata ko watanni.

Idan ka fara karatu (a aji ne ko ta hanyar littattafai), dole ne ka ciyar da lokacinka a kowane lokaci; dare da rana safe da yamma. Karatu ne da ya shafi karantawa da kwatantawa. Duk abin da ka karanta, to dole ne ka kwatanta shi, don ilimin da fasahar da hikimar su tabbata a kwakwalwarka. Hakan kuwa bazai yiwu ta dadi ba sai ka sadaukar da kanka.

Da yawa cikin masu karatu sun sha turo mini tambayoyi cewa wasu hanyoyi za su bi wajen koyon ilimin gina manhajar kwamfuta? Wato “Computer Programming” kenan. Ga wadanda na samu damar basu amsa, nakan shawarce su da su tanadi lokaci ne, a karon farko. Domin sai ka baiwa karatu lokacinka, sannan zai baka kansa, ka kwashi abin da kake so. Amma idan dabi’arka ita ce kailula, ka je ka nemi wani fannin daban ba wannan ba. Wannan ita ce gaskiya mai daci da ta kamata mai karatu ya santa, ya fahimce ta, sannan ya hakikance samuwarta don cin nasara.

*Hakuri da Juriya*

Bayan bayar da lokaci, dole ne mai karatu kuma ya dimanci hakuri da juriya. Meye bambancin dake tsakaninsu? Shi hakuri shi ne tilasta rai ko zuciya wajen yin abin da ba lalai bane taso a kowane lokaci, don samar mata da maslaha a kusa ko a nesa. Kada mai karatu ya damu dani, wannan ma’anar da na bayar a al’adance nake nufi. A daya bangaren kuma, juriya shi ne: tabbatuwa akan hakuri. Wato ka jure dabi’ar hakuri; jiya, da yau, da gobe, da jibi…ilaa maa shaa’Allahu. Domin kana iya yin hakuri na minti biyar, ko goma, ko sa’o’i, kai ko ma shekara. Amma daga baya kayi zarya saboda gazawa. Wannan ba lalai bane ya samar maka da maslahar da kake so cikakke. Amma ka dimanci hakuri, ka daure a kan hakuri, ka kuma jure, shi ne abin da ake kira: Juriya.

Ga wanda ya dabi’antu da dabi’ar hakuri da juriya, kwarewa a fannin gina manhajar Android ba wani abu bane mai wahala. Domin sinadarin aikin kenan. A farkon lamari za ka ta tafka kura-kurai masu yawa, masu muni. Idan ba ka da hakuri sai ka fasa ma baki daya. Sannan kana iya kashe lokaci mai tsawo kana tsara wata manhaja, sai ka fara ginawa a aikace, ka zo gwaji, sai ka cije. Kana iya daukan kusan mako baka fahimci a ina matsalar take ba. Idan ba ka da hakuri sai ka fasa. Amma idan ka jure, kana cikin bincike sai ka ga ma ashe watakila wani digo ne kawai ka mance baka diga a gaban wata kalma ba. Kana digawa shikenan, sai ka ga manhajar ta mike, rau rau, zam zam.

Bayan ka gama ginawa ma tsuguno bata kare ba. Kai, yanzu ne ma ka fara aikin. Sai ka dauki tsawon lokaci kana gwaji (Test Running), kana gano kurakurai (Debugging), sannan kana gyara inda aka samu matsaloli. Kuma abinka da wayoyin salula, duk da cewa babbar manhajar iri daya ce, amma dole sai ka ta gwaji a wayoyin kamfanoni nau’uka daban-daban, don tabbatar da daidaituwarta a kowane irin mahalli (Stability and Compatibility). In kuwa ba haka ba, sai aiki ya dawo danye, bayan a tunaninka komai daidai yake. Dukkan wannan na bukatar hakuri da juriya. Da zarar ka tanadi wadannan sinadaran rayuwa guda biyu, sai abu na karshe, wato: kayan aiki.

*Kayan Aikin Ginawa*

Kayayyakin aikin da kake bukata sun kai biyar zuwa shida. Abu na farko dai shi ne, dole ka mallaki kwamfuta, nau’in tafi-da-gidanka (Laptop) ko ta kan tebur (Desktop), wacce za ka iya jona ta da Intanet lokaci zuwa lokaci. Sannan dole ne ya zama tana dauke da manhajar da za ta iya riskar da kai zuwa Intanet, wato Manhajar Lilo kenan (Internet Browser). Amfanin mallakar kwamfuta kuwa shi ne, duk abin da za ka gabatar a kanta zai gudana; daga farko har karshe. Sannan dukkan manhajojin da za ka yi amfani dasu wajen wannan aiki, daga Intanet za ka saukar dasu. Wani abin sha’awa ma shi ne, dukkan wadannan manhajoji da tsare-tsare kyauta ne, ba za ka kashe ko kwandala ba.

Bayan mallakar kwamfuta da karikitanta, sai manhajoji guda hudu da za ka saukar, daga gidajen yanar sadarwa daban-daban. Kamar yadda na fada a baya ne, dukkan wadannan manhajoji kyauta ake bayar dasu.

Manhajar farko ita ce manhajar JAVA. Za ka samu wannan manhaja mai dauke da tubalin gina manhajar kwamfuta da yaren Java ne a <http://java.oracle.com/downloads>. Duk da cewa zubin Java a halin yanzu yana kan na takwas ne (Version 8 – Java 1.8), har yanzu ba a fara gina manhajar Android da zubin Java na bakwai ma ba, sosai, balle na takwas. Idan kaje za ka saukar da zubin Java na shida ne (Java 6, ko Java 1.6). Bayan haka, akwai nau’uka wajen uku ne – Java Runtime Environment, da Java EE, da Java SE. Sai ka saukar da Java SE, wato “Standard Edition” kenan. Bayan ka gama saukarwa sai ka loda (Install) wa kwamfutarka.

Manhaja ta biyu ita ce manhajar “Android SDK,” wato tubalin dake dauke da tsare-tsaren gina manhajar Android. Cibiyar aikin kenan, gaba daya. Wannan za ka same ta a gidan yanar sadarwar Android, kai tsaye. Sai ka saukar, amma bayan ka gama saukarwa (Downloading), ba loda (Install) wa kwamfutarka za ka yi ba, domin ba dunkulalliyar manhaja bace irin ta al’ada. Za ka nemi mahalli ne a ma’adanar kwamfutarka (Drive C:), sai ka bude sabon burgamin adana bayanai (Folder), ka adana a ciki. Idan ba canza mata suna aka yi ba, za ka ga sunan kamar haka: *android-sdk-windows*. Da zarar ka adana wannan tubali a mahallinsa, sai ka zarce Intanet don neman makami na uku, wato allon rubutu kenan.

Manhaja ta uku ita ce allon rubutu, wato “Text Editor.” Akwai nau’ukansu da yawa. Amma wanda yafi shahara, yafi sauki, sannan yafi dacewa da tubalin Java SE da ka saukar a fari, shi ne: *Eclipse Text Editor,* wanda ke dauke da abubuwa da dama masu sawwake aikin. Babban aikin wannan allon rubutu, kamar yadda mai karatu zai ga shafinsa a tsakiya, a kansa ne maginin manhajar zai ta tsara yadda yake son manhajar ta kasance, a rubuce. Bayan ya rubuta, yayi gwaji, sannan yayi ‘yan gyare-gyaren da suka kamata, akwai kwarangwal na wayar salula nau’uka daban-daban a jikin wannan allo, wadanda mai karatu zai rika amfani dasu wajen gwaji. Wadannan kwarangwal su ake kira “Mobile Emulator.” Duk abin da ka gina, sai ka kira wannan kwarangwal na wayar salula, ka loda manhajar a ciki, za ta nuna maka yadda manhajarka za ta bayyana a hakikanin wayar salula. Amma kafin ka kai ga wannan mataki na fara gina manhaja, sai ka saukar da makami na karshe.

Wannan makami kuwa ba wata manhaja bace mai zaman kanta, a a. Karin tagomashi ne, wato “Plugins.” Da zarar ka loda wa kwamfutarka wancan manhaja ta allon rubutu mai suna: “Eclipse Text Editor,” sai ka budo wannan allo, kaje sashen “Windows” dake sama ka matsa, sai ka gangara can kasa, ka latsa: “Android SDK Manager,” nan take zai fara saukar maka da wadannan bayanan tagomashi. Wadannan bayanai ana kiransu “Eclipse Android Plugins” ne. Aikinsu kuwa shi ne su tabbatar kana gina manhajar da ta dace da babbar manhajar Android dake dauke kan wayoyi ne.

Idan mai karatu bai mance ba, a baya munyi bayani kan nau’in zubin Android, wato “Android Versions.” Wadannan nau’uka sun sha bamban, tunda ba lokaci daya aka gina su ba. Don haka, wannan dan aike mai suna “Android SDK Manager” shi zai saukar maka da dukkan bayanan da suka dace da kowane irin nau’in Android ne. Domin da zarar ka yi yunkurin kirkirar sunan manhajar, tun kafin ka kai ga samar da sassanta, za a bukaci ka tantance nau’in Android din da kake son Manhajar da kake ginawa ta dace da ita. Sai dai kuma, idan kana saukar da wadannan bayanai, dole ne ka tanadi “Data” mai dimbin yawa, domin yana daukan lokaci, duk da cewa ya danganci nau’in bayanan da kake bukatar saukarwa. Da zarar ka gama saukarwa kuma, sai ka kama aiki.

Wadannan, a takaice, su ne iya abin da zan iya samarwa ga masu karatu kan batun babbar manhajar Android. Nan da makonni uku masu zuwa, in Allah ya yarda, akwai kasidar da za ta bibiyi wannan wajen dacewar maudu’i, mai take: “Korafe-Korafen Jama’a kan Android.” Ita ce kasidar da za ta fayyace wa mai karatu dalilan da suka sa yake korafi kan dabi’u da halayyar Android. Kafin nan, za mu sauya akala don gudanar da bincike na musamman mai take: “Manyan Tekunan Duniya: Tsarinsu, da Abubuwan dake Dauke Cikinsu,” a mako mai zuwa, in Allah yaso.